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(10)
F. C. Hopkins
C. J. Fox
D. L. Clark
N. Hagis
S. P. Yuhas
~~H. E. Winkler~~

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An evaluation of the Reliability, Availability, Maintainability and Durability (RAMD) characteristics of the Boeing YUH-61A and the Sikorsky YUH-60A UTTAS candidates was conducted. The evaluation is based on Development Test II (DT II) and Operational Test II (OT II) data. The Boeing and Sikorsky UTTAS candidates' demonstrated RAMD characteristics are compared to each other as well as to the Bell UH-1H and the requirements as stated in the UTTAS Materiel Need (MN) and the Decision Coordinating Paper (DCP).

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LIST OF ABBREVIATIONS

ACM	- Actual Clock Maintenance
ACRFT	- Aircraft
AMSAA	- Army Materiel Systems Analysis Activity
ARINC	- Aeronautical Radio Incorporation
ASAR&D	- Assistant Secretary of the Army for Research and Development
ASC	- Annual Support Cost
AVIM	- Aviation Intermediate Maintenance
AVSCOM	- Aviation Systems Command
AVUM	- Aviation Unit Maintenance
BITE	- Built In Test Equipment
CFE	- Contractor Furnished Equipment
DARCOM	- Development and Readiness Command
DCP	- Decision Coordinating Paper (formerly Development Concept Paper)
DOD	- Department of Defense
DSARC	- Defense System Acquisition Review Council
DS	- Direct Support
DT	- Development Testing
ED	- Engineering Development
FD/SC	- Failure Definition/Scoring Criteria
FH	- Flight Hours
GCT	- Government Competitive Testing
GE	- General Electric
GFE	- Government Furnished Equipment
GS	- General Support
HOGE	- Hover Out of Ground Effect
Hr	- Hour
LRU	- Line Replaceable Unit
MAV	- Minimum Acceptable Value
MMH	- Maintenance Man-Hours
MMHD	- Maintenance Man-Hours Direct
MMHI	- Maintenance Man-Hours Indirect

LIST OF ABBREVIATIONS (Continued)

MN	- Materiel Need
MOA	- Memorandum of Agreement
MOS	- Military Occupational Specialty
MPA	- Military Pay and Allowances
MSL	- Missile
MTBA	- Mean-Time-Between-Aborts
MTBF	- Mean-Time-Between-Failure
MTBO	- Mean-Time-Between-Overhaul
MTBR	- Mean-Time-Between-Removal
MWO	- Modification Work Order
NOE	- Nap of the Earth
NORM	- Not Operationally Ready Due to Maintenance
NORS	- Not Operationally Ready Due to Supply
N_R	- Main Rotor Speed
O&S	- Operating and Support
ORG	- Organizational
OT	- Operational Test
OTEA	- Operational Test and Evaluation Agency
P&A	- Pay and Allowances
PCS	- Permanent Change of Station
PIDS	- Prime Item Development Specification
PMO	- Project Manager's Office
POL	- Petroleum, Oil, and Lubricants
R&M	- Reliability and Maintainability
RAM	- Reliability, Availability and Maintainability
RAMLOG	- Reliability, Availability, Maintainability and Logistics
TBO	- Time Between Overhaul
TECOM	- Test and Evaluation Command
THIR	- Ten Hour Inspection Requirement
TNG	- Training
TOE	- Table of Organization and Equipment
TRADOC	- Training and Doctrine Command
UTTAS	- Utility Tactical Transport Aircraft System

LIST OF ABBREVIATIONS (Continued)

WESEIAC	- Weapons System Effectiveness Industry Advisory Committee
XMSN	- Transmission

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AN EVALUATION OF THE
RELIABILITY, AVAILABILITY, MAINTAINABILITY AND DURABILITY OF THE
UTILITY TACTICAL TRANSPORT AIRCRAFT SYSTEM

EXECUTIVE SUMMARY

The AMSAA Reliability, Availability, Maintainability and Durability (RAMD) analysis of the UTTAS DT/OT II data addressed the following issues:

1. Comparison of RAMD Characteristics of the UTTAS candidates,

2. Assessment and Demonstration of MN, DCP and TRADOC RAMD Requirements, and

3. Comparison of the RAM Characteristics of the UTTAS and the UH-1H.

The results and conclusions of this analysis are summarized for each of these issues. Problem areas and suggested improvements are also discussed. For reference purposes, Table 1 provides an independent AMSAA assessment of UTTAS and UH-1H RAMD parameters. The evaluation of UTTAS RAMD characteristics in this summary addresses the results of DT II and the last 200 hours of OT II except where noted. Statistical tests of significance are conducted at the α=.10 level unless indicated otherwise. Parts provisioning for repair of combat damage and the associated maintenance are not addressed in this report.

1. <u>Comparison of RAMD Characteristics of the UTTAS Candidates</u>.

a. <u>System Reliability (System MTBF)</u>.

The MTBF estimates of the Boeing and Sikorsky UTTAS during DT II and the last 200 hours of OT II are shown in Table 1. There was no significant difference between the MTBF estimates of the UTTAS candidates in DT II. Considering the last 200 hours of OT II, the Boeing MTBF was significantly higher than the Sikorsky MTBF at the α=.15 level. Both UTTAS candidates demonstrated a higher system MTBF in OT II as compared to DT II. However, the Boeing UTTAS achieved a larger MTBF increase than Sikorsky. The Boeing increase was significant at the α=.01 level. The Sikorsky increase was significant at the α=.15 level. Engineering modifications in DT II and differences in the DT and OT flight profiles may be contributing factors to the reliability improvement of both UTTAS candidates in OT II.

During both DT II and OT II, the Boeing V56 prototype consistently demonstrated a higher system MTBF than that of any other Boeing or Sikorsky UTTAS prototype. It should be noted that the V56 aircraft was extensively refurbished after an accident which occurred during contractor flight testing in November 1975. At the time of the accident, the MTBF

TABLE 1

EXECUTIVE SUMMARY OF RAM PARAMETERS

RAM Parameter	UTTAS Demonstrated Value				UH-1H Assessment	TRADOC Interim Test Criteria	TRADOC MAV	DCP Interim Goal	MN Design Goal (Maturity)
	Boeing		Sikorsky						
	DT II	OT II*	DT II	OT II*					
System MTBF (Hours)	2.23	3.10	2.32	2.54	2.19	1.82	2.7	2.6	4.0
Mean-Time-Between Mission-Abort (Hours)	20.6	28.6	16.0	28.6	67.9	9.5	55.1	—	75.0
Inspection and Servicing Man-Hours Per Flight Hour (Scheduled Maintenance)	.94	.75	1.27	.72	1.24	—	2.17	—	1.0
Corrective Man-Hours Per Flight Hours (Unscheduled Maintenance)	2.24	1.16	1.44	1.32	.87	—	8.0	—	2.8
Total Maintenance Man-Hours Per Flight Hour	3.18	1.91	2.71	2.04	2.10	—	10.17	4.8	3.8
Operational Availability	.83	.85	.85	.84	.82	—	.75	—	.82

*Last 200 Hours

of the Boeing V56 prototype was significantly lower than the MTBF of the V57 prototype. The DT/OT II results, which now show the V56 aircraft with a significantly higher MTBF than V57, suggest that the V56 aircraft may have derived considerable benefit from the rebuilding after its accident.

The system MTBF parameter is deficient in regard to discriminating between critical and trivial failure modes. The criticality of system failures is analyzed in paragraph 2.1.1.3.5 of the main report. This analysis reveals that during DT/OT II 69 percent of all Boeing failures and 61 percent of the Sikorsky failures had no effect on mission availability of the aircraft. In addition, the high operational availability demonstrated by both UTTAS candidates indicates that maintenance downtime due to correction of the failures experienced during the tests is at an acceptable level.

b. Mission Reliability (Mean-Time-Between-Mission Abort).

There were no significant differences in the mean-time-between-mission abort estimates of the UTTAS candidates as shown in Table 1. Both candidates demonstrated a significantly higher mission reliability in OT II as compared to DT II.

The estimates of mission reliability during DT II and OT II are considered conservative since they were dependent upon pilot judgment and safety considerations in a prototype test environment. The analysis contained in paragraph 2.1.2.5 of the main report indicates that in a combat environment both UTTAS candidates could demonstrate a mean-time-between-mission abort at least twice as great as the value demonstrated during DT/OT II.

c. Maintainability.

The scheduled, corrective, and total maintenance burden (maintenance man-hours per flight hour) of the UTTAS candidates during DT II and the last 200 hours of OT II are shown in Table 1. The Sikorsky corrective and total maintenance burden in DT II was significantly less than that of Boeing. The scheduled maintenance burden of the Sikorsky UTTAS in DT II was significantly greater than that of Boeing. During the last 200 hours of OT II, however, there was no significant difference in the corrective, scheduled, or total maintenance burden of the two candidates.

d. Operational Availability.

The Boeing UTTAS demonstrated a slightly higher operational availability than that of Sikorsky during the last 200 hours of OT II, whereas the Sikorsky UTTAS demonstrated a slightly higher value than that of Boeing during DT II. These differences, however, are not significant.

e. Durability.

The Boeing UTTAS required 15 major dynamic component removals during DT/OT II as compared to 10 removals for Sikorsky. There were insufficient test hours to compare with reasonable confidence the mean-time-between-removal (MTBR) of Boeing and Sikorsky dynamic components.

f. Conclusions.

Two significant differences were detected in the RAM characteristics of the Boeing and Sikorsky UTTAS. These differences, however, were peculiar to the separate DT II and OT II results. The Boeing MTBF was significantly higher than that of Sikorsky during the last 200 hours of OT II but not significantly different during DT II. The Sikorsky maintenance burden was significantly less than that of Boeing during DT II, but not significantly different from that of Boeing during the last 200 hours of OT II.

Although both UTTAS candidates demonstrated significant reliability increases in OT II, the greater improvement of the Boeing UTTAS resulted in a significantly higher MTBF than that of Sikorsky in OT II and a significant reduction in the Boeing maintenance burden in OT II as compared to that of DT II. Engineering modifications in DT II and differences in the test environments have been mentioned previously as possible causes of the reliability increases of both UTTAS candidates.

2. Assessment and Demonstration of MN, DCP and TRADOC Requirements.

Comparison of RAMD parameters with all requirements and goals are based on the UTTAS demonstrated values during the last 200 hours of OT II.

a. DCP Interim Goals.

Table 1 shows that the Sikorsky MTBF during the last 200 hours of OT II was slightly below the DCP interim requirement but this difference is not significant. The Boeing MTBF was significantly higher than the DCP interim goal. During the entire OT II, both candidates demonstrated a slightly higher MTBF (3.24 hours for Boeing, 2.7 hours for Sikorsky). Both contractors demonstrated the interim goal for total maintenance man-hours per flight hour.

b. MN and DCP Design Goals.

The Boeing and Sikorsky man-hour per flight hour ratios for scheduled, corrective and total maintenance were significantly lower than the MN and DCP design goals.

The MN and DCP design goal of 4.0 hours MTBF has been assessed as a low risk for both UTTAS contractors provided that the current rate of system reliability growth can be maintained. In particular, reliability improvements may be necessary in the drive and electrical subsystems of both contractors. During OT II, these two subsystems accounted for 37 percent and 42 percent of the Boeing and Sikorsky failures, respectively. The contractor Reliability Prediction Reports estimate that these subsystems at maturity will account for 18 percent of the Boeing failures and 19 percent of the Sikorsky failures. During DT/OT II, 45 percent of the total Boeing failures and 71 percent of the total Sikorsky system failures were repeated malfunctions. Modifications directed at these failure modes offer a potential source of reliability growth in future development.

Both candidates demonstrated 28.6 hours between mission aborts. In order to demonstrate the design goal of 75 hours between mission abort, reliability improvements may be required in the Boeing electrical and drive subsystems and the Sikorsky drive and hydraulic subsystems. During DT/OT II, the drive and electrical subsystems accounted for 32 percent of the Boeing mission aborts. The Boeing Reliability Prediction Report estimates that these two subsystems at maturity will account for 8 percent of the mission aborts. The drive and hydraulic subsystems accounted for 46 percent of the Sikorsky mission aborts during DT/OT II. The Sikorsky Reliability Prediction Report estimates that these two subsystems at maturity will contribute 29 percent of the total number of aborts.

Demonstration of the MN goal of 20833 hours between safety of flight affecting failures is a high risk due to the limited number of test hours in the UTTAS development program. Each UTTAS contractor has incurred one safety o flight affecting failure during contractor and government testing. Appropriate corrective action was taken by both contractors to eliminate the cause of these safety of flight affecting failures.

Both candidates achieved an operational availability of approximately 0.85, slightly higher than the MN design goal of 0.82 at maturity. Maintaining this high availability will depend on keeping administrative and delay downtimes below 3 percent of total calendar time. Due to the uncertainty of delay time which reduces operational availability, this parameter should not be used as a rigid test criterion. Inherent availability and achieved availability, which are functions of only the actual maintenance downtime, should be used for test purposes.

The MN specifies that the Mean-Time-Between-Removal (MTBR) of major dynamic components shall be 1500 hours at maturity. At this point in the development program, there are insufficient flight test hours to assess this requirement. Verification of MTBR will be possible by continued tracking of limited production aircraft.

c. <u>TRADOC Minimum Acceptable Values (MAV's) and Interim Test Criteria</u>.

Both UTTAS contractors satisfied the TRADOC interim test criteria of 1.82 hours MTBF and 9.5 hours between mission abort with 90 percent confidence. Furthermore, the MAV's to be achieved during DT/OT III for fault corrective man-hours per flight hour (8.0), inspection and servicing man-hours per flight hour (2.17), operational availability (.75), and system MTBF (2.70) were satisfied by both candidates as point estimates during the entire OT II.

3. <u>Comparison of the RAM Characteristics of the UTTAS and the UH-1H</u>.

With the exception of mean-time-between-mission abort and the corrective maintenance burden as shown in Table 1, the UTTAS performance during the last 200 hours of OT II demonstrates a significantly improved or equal RAM capability as compared to the UH-1H. Expected reliability improvements in future development should increase the UTTAS mean-time-between-mission abort and decrease the corrective maintenance burden.

1. INTRODUCTION

1.1 General

This evaluation addresses the RAM characteristics of the Boeing and Sikorsky UTTAS prototypes and the Bell UH-1H. Pertinent RAM parameters of the three contractors' helicopters are assessed and compared with MN, DCP and MAV requirements, and estimates of mature values of selected RAM parameters are derived using Reliability Growth Methodology.

Current emphasis within DOD requires that the relationship of RAM parameters to total system worth be established. Dr. Currie, in a memorandum to ASAR&D (Appendix 6), requested that those RAM parameters which are critical in determining system worth be "further developed and thresholds and testing methods established." This evaluation presents an analysis of those RAM parameters which are most critical in determining system worth. Limitations for assessing these parameters during Government Competitive Testing (GCT) and proposed test methods for future assessments of them are also presented.

Parts provisioning for repair of combat damage and the associated maintenance are not addressed in this report.

1.2 Data Base.

The following four sources of RAM data were used to evaluate the UTTAS:

(1) 611 hours of testing of three UH-1H aircraft at Fort Campbell, Kentucky, from June - December 1975,

(2) 100 hours of testing of three UTTAS prototypes at each contractor facility from August - October 1975,

(3) 300 hours of DT II testing of two UTTAS prototypes of each contractor at Fort Rucker, Alabama, from March - June 1976, and

(4) 250 hours of OT II testing of two UTTAS prototypes of each contractor at Fort Campbell, Kentucky, from June - August 1976.

Analyses were conducted on the individual prototypes of Boeing and Sikorsky. Analyses were also conducted on the combined results of the two aircraft of each contractor. Unless otherwise specified, presentations in this evaluation are based on combined RAM characteristics of both prototypes of each contractor. All UH-1H data presented are based on the combined performance of all three aircraft.

The RAMLOG Data Collection System was used to collect the data in the above four tests. Two teams of Army personnel were trained by AVSCOM to properly record all RAM data during testing. The importance

of the data being collected in conjunction with the UTTAS program was emphasized to all members of both teams. The same two teams were used in all four tests.

AMSAA personnel participated in contractor aircraft familiarization courses with the members of both teams, and also had observed their outstanding performance during the DT II and OT II tests.

At the time the DT II and OT II RAM data were received by AMSAA, there were a number of maintenance actions in suspense which required chargeability decisions. These actions were independently assessed by AMSAA and incorporated into the analysis. In addition, the flight time accumulated by the contractor prototypes in transit from Fort Rucker to Fort Campbell were included in the AMSAA analysis of the DT II data. Consequently, the results presented by AMSAA may differ from the results published by other organizations.

1.3 RAM Scoring Criteria.

1.3.1 General. Data were collected during DT/OT II for all maintenance actions performed on both contractors' prototype aircraft. Each maintenance action was reviewed by the Screening Committee, in which AMSAA was a full time participant, at the Fort Rucker and Fort Campbell test sites and chargeability decisions were made in five categories. These categories were:

(1) Mission abort,

(2) Potential abort,

(3) System failure,

(4) Maintenance task time, and

(5) Contractor furnished or government furnished equipment.

Chargeability was assigned in each category in accordance with the UTTAS Failure Definition and Scoring Criteria (FD/SC) as contained in Appendix 2. This document was prepared by representatives from the UTTAS PMO, TRADOC, AVSCOM, OTEA, TECOM and AMSAA, and was approved by DARCOM and TRADOC.

Those chargeability decisions on maintenance actions for which the screening committee could not agree were referred to the Scoring Committee for resolution. This committee consisted of representatives from the UTTAS PMO, TRADOC and OTEA, with TECOM and AMSAA as advisors to DARCOM. The Scoring Committee also resolved all contractor protests of the Screening Committee decisions.

1.3.2 System Failure. System failures during DT/OT II were determined from the flow diagrams in Figures 2, 4 and 7 of the FD/SC document. Every unscheduled maintenance action was analyzed using these flow diagrams and then assigned one of the following five chargeability codes:

(1) N - Not a chargeable system failure.

(2) D - Dependent failure,

(3) C - Chargeable system failure,

(4) L - Higher level maintenance performed; failure was charged to the unit level maintenance action, or

(5) P - Pesky malfunction.

Detailed explanations of these five codes are found in Figures 2 and 7 of the FD/SC document.

1.3.3 Mission Abort. Criteria for charging a malfunction as a mission abort depended upon when the malfunction occurred. When a malfunction occurred in the aircraft after initiation of the preflight inspection and prior to take off a mission abort was charged if the malfunction had to be corrected prior to take off and active clock maintenance required to correct the malfunction was greater than 30 minutes. A malfunction occurring during flight was charged as a mission abort if an unscheduled landing or mission cancellation was necessary. Malfunctions of ground support equipment to be charged as mission aborts and other details of this definition may be found in Figure 3 of the FD/SC document.

Mission aborts which were charged during DT/OT II were for malfunctions which prevented mission completion in a peacetime test environment. Approximately 60 percent of these malfunctions would not have caused mission aborts in a combat environment. For example, in a peacetime situation a pilot might not take off if the APU generator, a backup electrical supply system, is inoperative. He might opt to have the generator repaired first. If the active repair time is greater than 30 minutes, an abort is charged. In combat, the pilot would probably take off and complete his mission without the APU generator. With two main generators, each capable of satisfying all electrical requirements of the aircraft, and the battery buss as a backup, the pilot would not be concerned with the possibility of a complete loss of electrical power.

Since the effect of malfunctions upon combat missions is as important as their effect upon peacetime missions, aborts which occurred during testing were also assessed for their impact upon combat missions. These results are presented in paragraph 2.1.2.

1.3.4 Engine Failure. Engine failure chargeability was evaluated in terms of the definition and criteria contained in the engine contractor's Prime Item Development Specification for the T700-GE-700 Turboshaft Engine. Appendix 3 presents the criteria for failure exclusion and failure class definition. Each engine maintenance action was classified in one of the following categories:

(1) Not engine chargeable (airframe item),

(2) Chargeable failure,

(3) Excluded failure,

(4) No failure, or

(5) Chargeability deferred pending engine contractor investigation.

Summary data are presented in terms of two parameters: The Mean-Time-Between-Failures (MTBF) and the Mean-Time-Between-Removals (MTBR). The MTBF is calculated by dividing the total engine hours by the number of chargeable failures which the MTBR is calculated by dividing the total engine hours by the number of unscheduled engine removals.

1.3.5 Safety of Flight Failure. The Flight Safety Flow Chart (Figure 6) of the FD/SC document provides detailed criteria for classifying flight safety failures. In order for a failure to be charged as flight safety affecting, it must occur during flight, result in an unintended landing or stoppage of test, and meet at least one of the following criteria:

(1) Cause injury or be potentially injurious to flight crew, passengers or ground crew,

(2) Cause a forced landing, or

(3) Cause damage to the aircraft.

1.3.6 Maintenance Task Time. Every maintenance action performed during DT/OT II was analyzed to assess maintenance task time chargeability by using Figure 5 of the FD/SC document. A number of maintenance actions such as towing and washing the aircraft or performing maintenance on interim Government Furnished Equipment (GFE) are excluded from task time chargeability. For detailed explanations see Appendix 2.

1.3.7 Potential Abort. Any malfunction discovered after initiation of the preflight inspection and prior to take off, which required corrective maintenance before take off was classified a potential abort. For example, if the transmission oil level was discovered to be low during

a preflight inspection and oil had to be added before take off, this event was classified as a potential abort. In addition, in flight mission aborts were included as potential aborts.

A detailed flow chart of a potential abort is presented in the FD/SC document.

1.3.8 Contractor Furnished Equipment (CFE) and Government Furnished Equipment (GFE). The equipment on which every maintenance action was performed was classified as either contractor furnished or government furnished. Details are found in the FD/SC document. Within the GFE category further scrutiny was required to determine whether the equipment was interim equipment. This distinction was necessary since maintenance performed on interim equipment was not considered chargeable. The rationale for this was that interim equipment would not be installed on the production aircraft, and maintenance performed on this type of GFE had no application to calculations of the maintenance burden for the aircraft.

The interim GFE will be replaced in production by modified versions with improved RAM characteristics. In addition, other GFE required for the production aircraft but not now on the prototypes will be installed. Par values for maintenance requirements and failure rates have also been established for both classes of GFE. These estimates are incorporated into a number of summaries in this report and their use is annotated in the applicable tables.

1.3.9 Mean-Time-Between-Removal (MTBR). The UTTAS MN (Reference 1) specified a mean-time-between-removal parameter. This parameter applies to the dynamic components of the aircraft which are defined in the MN to be, "those rotating and non-rotating items in the drive train and rotor(s) control with associated bearings, seals and vibration absorbers." A detailed listing of the aircraft dynamic components is presented in paragraph 2.4. A dynamic component is considered to undergo a "removal" from the aircraft when it is removed for scheduled or unscheduled overhaul or inspection at the depot level. The MN specifies that removals "caused by bearing failures, seal package, special inspections, lubrication replenishment, and replacement of parts" are to be accountable to the MTBR parameter.

2. ANALYSIS RESULTS

2.1 Reliability

2.1.1 System Reliability

2.1.1.1 Methodology. The quantitative system reliability assessment of the UTTAS and the UH-1H aircraft is expressed in terms of the Mean-Time-Between-Failure parameter under the assumption of a constant failure rate. Point estimates and 90 percent lower confidence bounds for the MTBF parameter are separately calculated for the two prototypes of each UTTAS contractor. In addition, an MTBF point estimate and 90 percent lower confidence bound is given for each UTTAS contractor's combined system of two prototypes.

Both UTTAS candidates demonstrated a significant increase in system MTBF in OT II as compared to the MTBF achieved in DT II. Therefore, the MTBF parameter is calculated as a separate point estimate for DT II and OT II.

The MTBF of the UH-1H is presented in terms of the combined system of three UH-1H aircraft. A point estimate and 90 percent lower confidence bound for system MTBF is provided for the UH-1H system.

All hypotheses of MTBF differences are tested at the $\alpha=0.10$ level of significance unless otherwise specified. Details concerning the methodology described above are contained in Appendix 1.

2.1.1.2 System Mean-Time-Between-Failure (MTBF).

2.1.1.2.1 DT II Performance. Tables 1 and 2 provide the MTBF estimates of the Boeing and Sikorsky prototypes during DT II. These values include an estimate of the failure rate of Government Furnished Equipment (GFE) which was not installed during DT/OT II, (Appendix 5, Table 1). In addition to the failures charged by the UTTAS Scoring Committee, four suspended maintenance actions and seven malfunctions which were coded by the UTTAS Scoring Committee as nuisance malfunctions have been assessed as failures against the Boeing system. Seven nuisance malfunctions have been assessed as failures against the Sikorsky system in addition to the failures charged by the UTTAS Scoring Committee.

TABLE 1

MTBF ESTIMATES OF THE BOEING PROTOTYPES - DT II

Aircraft	Flight Hours	MTBF Point Estimate (Hours)	MTBF - 90% Lower Confidence Bound (Hours)
Boeing V56	114.3	2.71	2.21
Boeing V57	196.8	2.02	1.77
Boeing (Combined)	311.1	2.23	1.99

The MTBF point estimate of aircraft V56 was significantly higher than the MTBF estimate of V57 during DT II.

It should be noted that the Boeing V56 prototype was extensively refurbished after an accident which occurred in November 1975 during contractor flight testing. The AMSAA Reliability Growth Model assessment of the Boeing flight test data through November 1975 showed the V56 prototype with an MTBF of 1.5 hours at the time of the accident. The MTBF estimate of the V57 aircraft at this time was 2.6 hours, significantly higher than that of the V56 aircraft. The DT II results, which now show the V56 prototype with a significantly higher MTBF than V57, indicate that the V56 aircraft may have derived considerable benefit from the rebuilding after its accident. No other Boeing or Sikorsky prototype was subjected to such extensive renovations prior to entering DT II.

TABLE 2

MTBF ESTIMATES OF THE SIKORSKY PROTOTYPES - DT II

Aircraft	Flight Hours	MTBF Point Estimate (Hours)	MTBF - 90% Lower Confidence Bound (Hours)
Sikorsky S50	110.3	2.39	1.96
Sikorsky S52	194.3	2.27	1.97
Sikorsky (Combined)	304.6	2.32	2.07

The MTBF point estimates of the two Sikorsky prototypes are not significantly different.

The MTBF point estimate of the combined Sikorsky system is slightly higher than the MTBF estimate of the combined Boeing system during DT II, but the difference is not significant.

2.1.1.2.2 OT II Performance. Tables 3 and 4 give the MTBF estimates of the Boeing and Sikorsky aircraft during OT II. These values include an estimate of the failure rate of GFE which was not installed during DT/OT II. (Appendix 5, Table 2). In addition, seven suspended maintenance actions and four malfunctions coded as nuisance malfunctions by the UTTAS Scoring Committee have been assessed as failures against the Boeing aircraft. Five suspended maintenance actions and seven nuisance malfunctions have been charged as failures against the Sikorsky system. These are included as failures in addition to all failures charged by the UTTAS Scoring Committee.

TABLE 3

MTBF ESTIMATES OF THE BOEING PROTOTYPES - OT II

Aircraft	Flight Hours	MTBF Point Estimate (Hours)	MTBF - 90% Lower Confidence Bound (Hours)
Boeing V56	138.1	4.33	3.41
Boeing V57	121.7	2.51	2.07
Boeing (Combined)	259.8	3.24	2.79

During both DT II and OT II the MTBF of the V56 prototype was significantly higher than the MTBF of V57.

TABLE 4

MTBF ESTIMATES OF THE SIKORSKY PROTOTYPES - OT II

Aircraft	Flight Hours	MTBF Point Estimate (Hours)	MTBF - 90% Lower Confidence Bound (Hours)
Sikorsky S50	120.4	3.50	2.78
Sikorsky S52	133.9	2.24	1.88
Sikorsky (Combined)	254.3	2.70	2.35

During OT II, the MTBF of S50 was significantly higher than the MTBF of S52.

The combined Boeing system demonstrated a significantly higher (α=.15) MTBF during OT II as compared to the combined Sikorsky system.

Both contractor systems demonstrated an increase in MTBF in OT II as compared to DT II. This increase is significant at the α=.01 level for Boeing and α=.15 for Sikorsky. An analysis of this reliability improvement is provided in the following paragraph.

2.1.1.2.3 Reliability Improvement in OT II. The reliability improvement for the two UTTAS contractors as evidenced by the increase in system MTBF from DT II to OT II is shown in Table 5. The slight decrease for Sikorsky aircraft S52 is not statistically significant.

TABLE 5

SYSTEM MTBF DT/OT II*

	DT II System MTBF (Hrs)	OT II System MTBF (Hrs)
Boeing V56	2.93	4.93
Boeing V57	2.14	2.77
Boeing (Combined)	2.37	3.61
Sikorsky S50	2.57	3.88
Sikorsky S52	2.43	2.39
Sikorsky (Combined)	2.48	2.92

*Does not include par values for GFE not yet installed on aircraft.

An examination of the basic differences between the two test phases was made in order to determine the possible cause or causes of these reliability differences. Areas addressed were possible weight differences, aircraft configuration differences and operational profile differences between DT II and OT II.

Examination of loads carried by the aircraft during DT II and OT II reveals that on the average the aircraft in DT II grossed approximately 700 pounds more than when operated in OT II. This could have been a factor contributing in some degree to the better reliability in OT II since higher gross weight entails greater stress levels. However, from the data available, no positive inferences can be drawn.

Basic configuration differences due to engineering modifications applied during DT II and OT II as well as their effectiveness in regard to RAM are addressed in Section 2.1.1.3.3. In summary, the contribution to reliability improvement as a result of engineering modifications applied by Sikorsky appeared to improve reliability on S50, but this improvement is not evident on S52. Evidence of some reliability improvement due to engineering modifications is indicated by the data for the Boeing aircraft.

A major distinction between the DT II and OT II testing is the flight profiles. Table 6 categorizes the type of flight profiles flown during the DT II and OT II testing.

TABLE 6

FLIGHT PROFILES

Testing	Flight* Profile	Number of Missions			
		Boeing		Sikorsky	
		V56	V57	S50	S52
DT II	1	122	166	121	185
	2	1	0	0	0
OT II	3	37	27	39	41
	4	110	103	99	122

*Flight Profile Code

1 - Fly indicated airspeed 145 to 170 knots, any altitude to 10,000 feet. Six landings and takeoffs. Terminate all approaches with a one-minute hover after landing.

2 - Fly indicated airspeed for best range. Perform six approaches to one-minute hover. Takeoff with maximum power sustained for one minute. Return external load to pick-up point.

3 - Nap of the Earth (NOE), speeds to 60 to 90 knots, internal or external load.

4 - Low level Contour Flights; speeds 80 to 120 knots, internal or external load.

Table 6 shows that approximately one-fourth of the OT II missions were NOE missions flown at speeds below 90 knots. The remaining OT II missions were low level contour flight flown at speeds below 120 knots. This differs from the DT II missions of which all but one involved flight at speeds between 145 and 170 knots.

In any rotary wing aircraft, the dynamic forces are substantially greater than the static loads. These dynamic forces, when applied to a complicated mechanism such as a helicopter, produce vibration to a greater or lesser degree. Excessive vibration, when present, is a prominent cause of component failures in rotary wing aircraft. The following paragraph presents partial results of a pilot survey as reported by TECOM in their analysis of the DT II testing of the Boeing and Sikorsky UTTAS candidates. This survey attempts to quantify the pilot's opinions in regard to various human factors to include vibration levels on a scale of one to ten (Human Factors Evaluation Rating Scale). A partial list of the rating scale guidelines with their associated scale rating is presented below. Only those ratings of interest are presented.

Pilot Rating	Aircraft Characteristics	Demands on Pilot
2	Good-Negligible Faults	Function and operability are good; operator compensation not a factor for desired performance.
5	Poor, Moderately Objectionable Faults	Function and/or operability need moderate improvement; require considerable compensation from operator.
6	Conditionally Acceptable, Objectionable, But Tolerable Faults	Ability to perform mission is marginal and requires extensive compensations by operator.

While both contractors were reported to have experienced vibration in particular landing approaches (common to both DT II and OT II), the Boeing aircraft encountered severe vibration in high speed flight as well. The overall vibration rating ascribed to the Boeing aircraft by the pilots during DT II was 5.40; Sikorsky obtained 1.95. The results of this pilot survey coupled with the previously discussed flight profiles of Table 6 suggest that the increase in MTBF for the Boeing UTTAS in OT II is due in part to the decreased flight speeds in OT II.

In summary, the OT II flight profiles may have contributed positively to the reliability of both UTTAS candidates during OT II. However, the reduction of vibration due to the lower airspeeds flown during OT II is a more plausible explanation for the MTBF increase from DT II to OT II for Boeing than for Sikorsky.

2.1.1.2.4 DCP Interim MTBF Requirement. The DCP (Reference 2) states that a MTBF value of 2.6 is to be demonstrated as a point estimate during the last 200 hours of OT II. Tables 7 and 8 provide the MTBF estimates of the Boeing and Sikorsky systems during this time period. In addition to the failures assessed by the UTTAS Scoring Committee, seven suspended maintenance actions and three nuisance malfunctions have been charged as failures against the Boeing system. Five suspended maintenance actions and seven nuisance malfunctions have been charged as failures against the Sikorsky system in addition to the failures assessed by the UTTAS Scoring Committee. The values in the table below include an estimate of the failure rate of GFE which was not installed during DT/OT II, (Appendix 5, Table 2).

TABLE 7

MTBF ESTIMATES OF THE BOEING PROTOTYPES - LAST 200 HOURS OF OT II

Aircraft	Flight Hours	MTBF Point Estimate (Hours)
Boeing V56	100.4	3.75
Boeing V57	99.5	2.63
Boeing (Combined)	199.9	3.10

TABLE 8

MTBF ESTIMATES OF THE SIKORSKY PROTOTYPES - LAST 200 HOURS OF OT II

Aircraft	Flight Hours	MTBF Point Estimate (Hours)
Sikorsky S50	88.9	3.36
Sikorsky S52	113.6	2.14
Sikorsky (Combined)	202.5	2.54

Both Boeing prototypes demonstrated the 2.6 MTBF interim requirement. The combined Sikorsky system MTBF was slightly below the 2.6 requirement. However, the S50 aircraft successfully demonstrated the 2.6 system MTBF. The combined Boeing MTBF was significantly higher than the combined Sikorsky MTBF at the α=.15 level of significance.

2.1.1.2.5 Assessment of the Design Goal for System MTBF. The MN and DCP specify a design goal of 4.0 hours for UTTAS system MTBF. The AMSAA Reliability Growth Model (Reference 3) has been used to assess the reliability growth demonstrated by each UTTAS contractor through all of contractor testing and DT/OT II. The inputs to the model for each contractor consisted of the failure rates over contractor testing, divided into three intervals of approximately 200 hour length, and the failure rate demonstrated during DT II and OT II combined.

The reliability growth curves thus obtained are presented in Appendix 7.

If the reliability growth rate demonstrated up to OT II can be maintained through the maturity phase, the projection shows that both UTTAS concepts should demonstrate an MTBF of approximately [illegible] hours. However, two major factors are involved in maintaining this rate of growth. First, the potential for growth in the system must exist.

If a system has already reach the state-of-the-art, there can be no reliability growth. Secondly, assuming the potential for reliability growth exists, the contractor's management must allocate the resources necessary to maintain an aggressive reliability improvement plan.

Continued reliability growth tracking during future testing will be necessary to insure that these conditions are satisfied.

2.1.1.2.6 UTTAS MTBF Comparison with the UH-1H. Table 9 compares the MTBF demonstrated by the UTTAS candidates during the last 200 hours of OT II with the MTBF achieved by a system of three UH-1H aircraft. The values for the UH-1H system were obtained from 611.5 hours of testing collected under the RAMLOG Data Collection System between June and December 1975.

TABLE 9

MTBF COMPARISON OF UTTAS AND UH-1H

Aircraft System	MTBF Point Estimate (Hours)	MTBF - 90% Lower Confidence Bound
Boeing (Combined)	3.10	2.62
Sikorsky (Combined)	2.54	2.19
UH-1H (Combined)	2.19	2.06

The MTBF demonstrated by the Boeing system was significantly higher than the MTBF of the UH-1H system at the α=.10 level. The Sikorsky MTBF was higher than the UH-1H MTBF with α=.15 level.

2.1.1.2.7 Reliability of the T700 Engine. The General Electric YT700 engine, which was installed on the UTTAS candidates during DT/OT II, will be replaced at the time of UTTAS production by the General Electric T700 engine. The T700 engine is an improved configuration of the YT700 engine.

The performance of the YT700 engine during DT/OT II was used to estimate the reliability of the T700 engine. Chargeability criteria for the T700 engine are contained in the YT700 Engine Failure Definition and Scoring Criteria, presented in Appendix 3.

A total of 11 failures during the 2216 engine flight hours accumulated on all Boeing and Sikorsky prototypes during the combined DT/OT II was assessed against the T700 engine. This yields a failure rate of 0.005 for a single engine, or a failure rate of 0.010 for two engines in series. The failure rate of 0.010 for two engines has been included in the UTTAS MTBF estimates of previous paragraphs.

A breakdown of engine failures and removals for each UTTAS contractor is shown in Tables 10 and 11. For the purpose of an equitable comparison, the engine failure rate of 0.010, mentioned above was assigned to each UTTAS contractor.

TABLE 10

BOEING VERTOL - T700 MTBF AND MTBR*

Test	Chargeable Failures	Engine Removals	Engine Flight Hours	Engine Hours	MTBF (Hrs)	MTBR (Hrs)
DT	4	3	617.4	829.0	207	276
OT	1	5	509.2	675.5	676	135
Totals	5	8	1126.6	1504.5	301	188

TABLE 11

SIKORSKY - T700 MTBF AND MTBR*

Test	Chargeable Failures	Engine Removals	Engine Flight Hours	Engine Hours	MTBF (Hrs)	MTBR (Hrs)
DT	4	1	606.2	733.3	183	733
OT	2	2	483.4	584.8	292	292
Totals	6	3	1089.6	1318.1	220	439

TABLE 12

COMPOSITE - GENERAL ELECTRIC T700 MTBF AND MTBR*

Test	Chargeable Failures	Engine Removals	Engine Flight Hours	Engine Hours	MTBF (Hrs)	MTBR (Hrs)
DT	8	4	1223.6	1562.3	195	391
OT	3	7	992.6	1260.3	420	180
Totals	11	11	2216.2	2822.6	257	257

*MTBF and MTBR estimates are given in terms of engine operating hours as opposed to engine flight hours.

NOTE: See page 11 for explanation of abbreviations used in tables.

2.1.1.3 System Failure Analysis.

2.1.1.3.1 General. The following sections present an analysis of the effects of DT II and OT II system failures on the various RAM parameters. In addition, the engineering modifications are assessed in terms of their impact on system failures.

2.1.1.3.2 Repeated Failures. A number of the Boeing and Sikorsky UTTAS failures were charged to components which failed more than once. Appendix 10 lists those components which failed more than once during DT II and OT II. Table 13 shows that 45 percent of the total Boeing system failures and 71 percent of the total Sikorsky system failures were repeated malfunctions.

TABLE 13

REPEATED SYSTEM FAILURES

Contractor Testing	No. of Components That Failed More Than Once	No. of System Failures Charged To These Components	Percent of Total Number of System Failures
Boeing-DT II	18	57	46%
Boeing-OT II	8	25	36%
Boeing-DT II/OT II	20	87	45%
Sikorsky-DT II	18	84	71%
Sikorsky-OT II	17	52	65%
Sikorsky-DT II/OT II	27	140	71%

Figure 1 shows the impact on system MTBF of the failure rate of components which experienced more than one failure during DT II/OT II. The points on the abscissa represent a range of failure rates assigned to the components which experienced more than one failure. These failure rates for the Boeing UTTAS vary from 0.00 to 0.15, the latter estimate being the actual failure rate observed during DT II/OT II. Failure rates of these components on the Sikorsky UTTAS vary from 0.00 to 0.25, the latter value being the failure rate observed during DT II/OT II. The points on the ordinate represent the system MTBF estimate which would be realized at the various component failure rates on the abscissa.

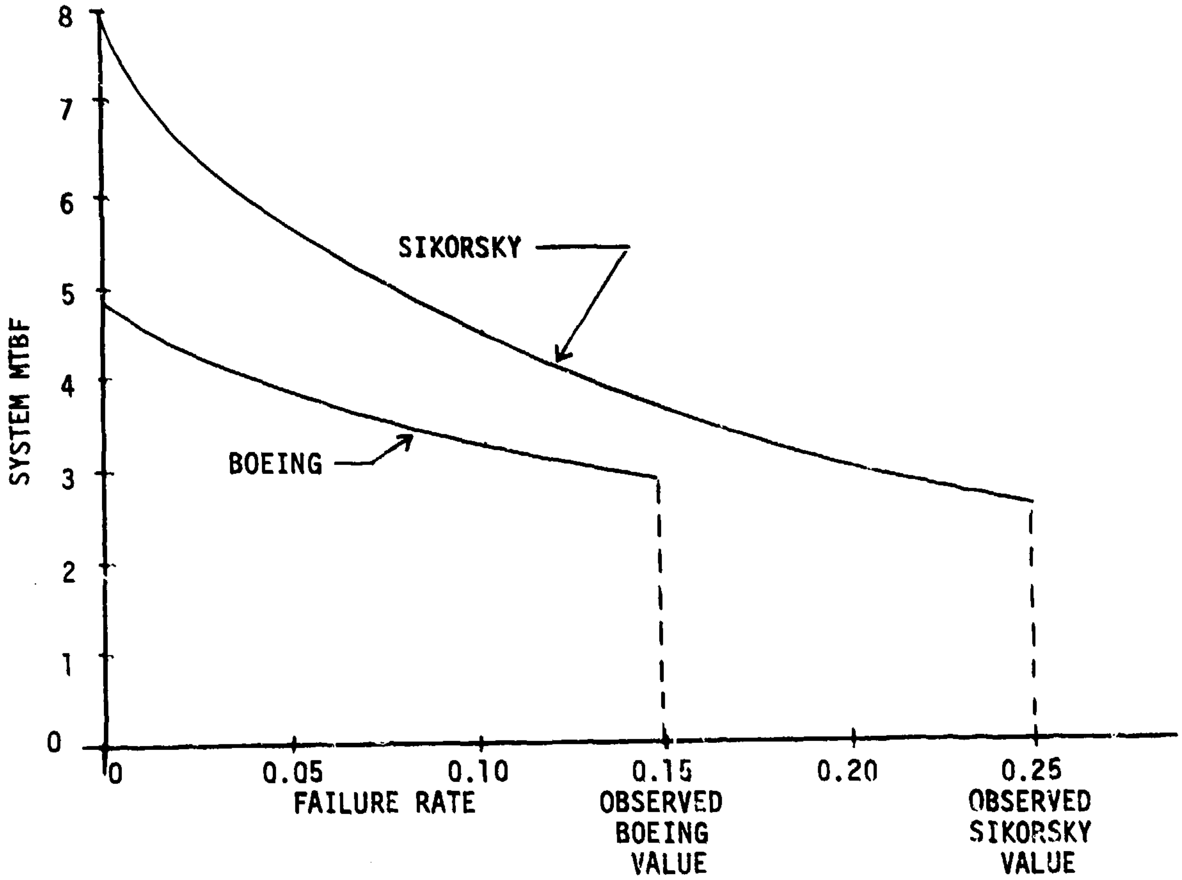

FIGURE 1. SENSITIVITY OF SYSTEM MTBF TO FAILURE RATE OF COMPONENTS WHICH EXPERIENCED MORE THAN ONE FAILURE IN DT II/OT II

Figure 1 shows that system MTBF degrades from 4.88 to 2.80 for Boeing and from 8.14 to 2.65 for Sikorsky as the failure rate of those components which failed more than once is varied from zero to the value observed during the combined DT II and OT II testing. For example, as the repeated-failure-components' failure rates increased to 0.10 failures per flight hour, the system MTBF estimates decreased to 3.28 hours for Boeing and 4.44 hours for Sikorsky.

2.1.1.3.3 Effect of Engineering Modifications. Table 14 of this section is a summary of the engineering modification efforts of the Boeing and Sikorsky contractors during DT II and OT II. A complete list of the components which were modified through Modification Work Orders (MWO) during DT II and OT II is in Appendix 9.

TABLE 14

ENGINEERING MODIFICATIONS

Contractor - Testing	No. of [1] Engineering Modifications	No. of [1] Resulting MWO, Both Aircraft	Pre-Modification Failures Per Hr. Of Modified Components	Post Modification Failures Per Hr. Of Modified Components
Boeing - DT II	11	29	0.0158	0.0128
Boeing - OT II	3	3	0.0000	0.0000
Boeing - DT II/OT II	14	32	0.0158	0.0128
Sikorsky - DT II	23	57	0.0621	0.0152
Sikorsky - OT II	7	44	0.0109	0.0100
Sikorsky - DT II/OT II	30	101	0.0730	0.0252

[1] Does not include YT700 Engine Modifications.

NOTE: See page 11 for explanation of abbreviations used in table.

Table 14 shows that the effect of the 14 Boeing Engineering Modifications during DT II and OT II was to decrease the failure rate of the modified components from 0.0158 failures per hour to 0.0128. The 30 Sikorsky Engineering Modifications accounted for a decrease in the failure rate of the modified components from 0.0730 to 0.0252. These reductions of the failure rate of the modified components translate to a 24 percent decrease for Boeing and a 63 percent decrease for Sikorsky.

2.1.1.3.4 Subsystem Failures. A breakdown of the Boeing and Sikorsky system failures by subsystem is in Appendix 26. Table 15 is a summary of those subsystems which experienced the highest failure rates during DT II and OT II.

TABLE 15

SUBSYSTEMS EXPERIENCING THE HIGHEST FAILURE RATES

Contractor - Testing	High Failure Rate Subsystems	Percent of Total Failures	ACM Per Event	MTBF
Boeing - DT II	Drive, Electrical, and Avionics	50%	1.94	4.94
Boeing - OT II*	Drive, Electrical, and Airframe	51%	1.40	8.00
Sikorsky - DT II	Power Plant and Pneumatic, Drive, and Electrical	52%	0.94	4.55
Sikorsky - OT II*	Airframe, Drive, and Electrical	55%	0.74	5.96

*Last 200 hours, contractor equipment only.
NOTE: See page 11 for explanation of abbreviations used in table.

For both contractors during DT II and OT II, over fifty percent of the total system failures are charged to three subsystems. The large jump in Boeing MTBF for the three worst subsystems (DT II = 4.94; OT II = 8.00) is primarily due to the decrease in failures charged to the Electrical and Avionics subsystems.

2.1.1.3.5 Criticality of System Failure. The RAMLOG data collection system classifies system failures according to the result they have on aircraft operability. This section presents those failures which: (1) caused the aircraft to be not mission available, (2) caused a mission abort, or (3) affected the safety of flight.

A system failure can cause the aircraft to be not mission available either because of the criticality of the failed component, or due to the nature of the repair action. A critically failed component is any component or piece-part which is in such a condition as to cause the aircraft to be not mission available. An example of a system failure repair action that caused the Boeing aircraft V57 to be not mission available is maintenance fault number 6222V57C11Z. This maintenance action was initiated for the replacement of a leaking actuator. Although the leak was minor enough not to have grounded the aircraft, the removal of the actuator did cause the aircraft to be not mission available.

Appendix 2 contains a copy of the complete scoring criteria used by the UTTAS screening committees for charging mission aborts. Generally, a system failure will cause a mission abort if it meets one of the following two criteria: (1) The failure is discovered during pre-flight and the repair action or actions delay the mission by more than 30 minutes, or (2) The failure is discovered during flight and causes premature termination of the mission. Consequently, all mission abort type system failures will cause the aircraft to be classified as not mission available.

Any system failure which actually caused an unsafe flight event is considered a safety of flight affecting failure. From the first block of the Flight Safety flow chart, shown in Appendix 2, and the previous definitions, it is evident that all safety of flight affecting failures are also charged as mission aborts.

The DT II/OT II mission affecting failures are summarized in Table 16 for the Boeing and Sikorsky UTTAS prototypes.

TABLE 16

CLASSIFICATION OF SYSTEM FAILURES

	Boeing		Sikorsky	
System Failure Effect	DT II	OT II	DT II	OT II
No effect on mission availability	91	49	71	58
Not mission available due to the repair action but did not cause a mission abort	15	4	8	4
Not mission available due to criticality of the failed component but did not cause a mission abort	13	15	28	19
Caused a mission abort but did not affect the safety of flight	12	5	16	5
Affected the safety of flight	0	0	0	1
Total System Failures	131	73	123	87

From the above table it can be determined that of the 204 Boeing system failures during DT II/OT II, 69 percent would not prohibit the aircraft from performing a mission if it were called upon to do so. Thirty-one percent of the Boeing system failures, either due to the nature of the repair action or because of the criticality of the failed component, resulted in the aircraft being not mission available. However, only 8 percent of the total Boeing system failures actually caused mission aborts. There were no Boeing safety of flight affecting system failures during DT II/OT II.

In comparison, 61 percent of the Sikorsky system failures would not prohibit the aircraft from performing a mission if it were called upon to do so. Ten percent of the Sikorsky system failures actually caused mission aborts of which one event was charged as a safety of flight affecting failure.

The Sikorsky system failures were, by a greater percentage, more critical. Examination of Table 16 shows that during DT/OT II, Sikorsky and Boeing prototypes experienced, respectively, 81 and 64 system failures which caused the aircraft to be not mission available. Of the 81 Sikorsky system failures which caused the aircraft to be not mission available, 85 percent were due to the criticality of the failed component. This is in contrast to Boeing's 64 not mission available type system failures of which 70 percent were so charged due to the criticality of the failed component.

2.1.1.3.6 Nuisance Type Malfunctions. The UTTAS Scoring Committee established a separate category for those malfunctions which were of the nuisance or "pesky" variety, (Appendix 2, Figure 7). This category includes specifically the following items:

(1) Missing or broken common fasteners, e.g., missing bolts, screws, rivets and

(2) Minor repairs of sheet metal and fiberglass.

This classification of malfunctions was approved in June 1976 by the Deputy Commanding General for Materiel Development, DARCOM, and the Deputy Chief of Staff for Combat Development, TRADOC, in accordance with AR 702-3.

Generally, these types of malfunctions have no impact whatsoever on system effectiveness or safety and require only a small amount of maintenance time. However, if a malfunction of this type had any impact on safety of flight or mission effectiveness, it was excluded by the UTTAS Scoring Committee from the nuisance malfunction category and assessed as a failure against the system.

The UTTAS Scoring Committee did not consider a specific maintenance time as a criterion for the nuisance malfunction category. In this evaluation however, those nuisance type malfunctions which required more than 30 minutes maintenance time are not considered to be representative of the nuisance malfunction category. Those nuisance malfunctions which required more than 30 minutes to repair have been assessed as failures in this evaluation and are included in the calculation of the MTBF parameters of paragraph 2.1.1.2.

Table 17 provides the number of nuisance type malfunctions which occurred during DT II and OT II and the distribution of their maintenance times.

TABLE 17

NUISANCE TYPE MALFUNCTIONS - DT/OT II

Aircraft System	Total Number of Nuisance Type Malfunction DT/OT II	Maintenance Time (Minutes)		
		0-15	16-30	Greater Than 30
Boeing V56	14	10	4	0
Boeing V57	59	37	11	11
Boeing (Combined)	73	47	15	11
Sikorsky S50	16	11	3	2
Sikorsky S52	50	29	9	12
Sikorsky (Combined)	66	40	12	14

Approximately 60 percent of the total number of nuisance malfunctions of each contractor required less than 15 minutes of elapsed maintenance time. Approximately 15 percent of the total number of Boeing nuisance malfunctions and 21 percent of the Sikorsky nuisance malfunctions required more than 30 minutes of elapsed maintenance time.

Table 18 gives the elapsed maintenance time per nuisance malfunction and the elapsed maintenance time per flight hour for all nuisance malfunctions charged by the UTTAS Scoring Committee.

TABLE 18

NUISANCE MALFUNCTION MAINTENANCE CHARACTERISTICS

Aircraft System	Elapsed Maintenance Time Per Nuisance Malfunction(Minutes)	Elapsed Maintenance Time Per Flight Hour For Nuisance Malfunctions(Minutes)
Boeing (Combined)	21.0	2.8
Sikorsky (Combined)	19.2	2.2

As mentioned previously, those nuisance malfunctions which required more than 30 minutes of elapsed maintenance time have been assessed as failures in this evaluation. Table 19 shows the elapsed maintenance time per malfunction and the elapsed maintenance time per flight hour for those nuisance malfunctions which required 30 minutes or less of elapsed maintenance time.

TABLE 19

NUISANCE MALFUNCTIONS WITH LESS THAN 30 MINUTES MAINTENANCE TIME

Aircraft System	Elapsed Maintenance Time Per Malfunction(Minutes)	Elapsed Maintenance Time Time Per Flight Hour (Minutes)
Boeing (Combined)	11.4	1.2
Sikorsky (Combined)	10.2	0.9

Elimination of those nuisance malfunctions which required more than 30 minutes of elapsed maintenance time thus reduced the maintenance time per malfunction and the maintenance time per flight hour for nuisance malfunctions by approximately 50 percent.

The mean-time-between-nuisance malfunction for the two aircraft systems during DT/OT II are given in Table 20. The nuisance malfunctions which required more than 30 minutes of maintenance time are not included since they have been assessed as failures against the system MTBF parameter of paragraph 2.1.1.2.

TABLE 20

MEAN-TIME-BETWEEN-NUISANCE MALFUNCTION

Aircraft	Mean-Time-Between-Nuisance Malfunction (Hours)	
	DT II	OT II
Boeing V56	22.9	17.3
Boeing V57	7.9	5.1
Boeing (Combined)	10.4	7.9
Sikorsky S50	13.8	20.1
Sikorsky S52	14.9	5.4
Sikorsky (Combined)	14.5	9.8

Nuisance malfunctions had a slightly higher rate of occurrence on the Boeing system during DT II and OT II than on the Sikorsky system, but the difference in nuisance malfunction rates was not significant. The combined system of three UH-1H aircraft was charged with 16 nuisance malfunctions in 611.5 hours, a significantly lower rate of occurrence than either UTTAS candidate.

2.1.2 Mission Reliability.

2.1.2.1 Methodology. Mission reliability is defined as the probability of completing a one-hour mission without occurrence of an equipment malfunction that is cause for a mission abort. Missions are considered to include a pre-flight inspection and landing at a predetermined area.

Estimates of mean-time-between-mission abort and mission reliability as defined above will be given for each prototype of the UTTAS candidates. In addition, mean-time-between-mission abort and mission reliability estimates will be provided for each UTTAS contractors' combined system of two prototypes.

The mission reliability characteristics of the UH-1H will be presented in terms of the combined UH-1H system consisting of three aircraft.

A constant mission abort rate will be assumed in the calculation of mission reliability for the UTTAS prototypes and the UH-1H system. All statistical tests between mission reliability differences will be conducted at the α=.10 level of significance.

Additional details concerning the methodology described above are contained in Appendix 1.

2.1.2.2 DT II Performance. The mission reliability characteristics of the UTTAS prototypes during DT II are given in Tables 21 and 22. An estimate of the mission failure rate of GFE which was not installed during DT/OT II has been included in the values below, (Appendix 5, Table 2).

TABLE 21

BOEING MISSION RELIABILITY - DT II

Aircraft	Mean-Time-Between-Mission Abort (Hrs)	Mission Reliability (1 Hr Mission)	Mission Reliability 90% Lower Confidence Bound
Boeing V56	53.3	.981	.955
Boeing V57	15.2	.936	.908
Boeing (Combined)	20.6	.953	.934

The mission reliability of the V56 prototype was significantly higher during DT II than the mission reliability demonstrated by the V57 prototype. This is consistent with the superior system reliability demonstrated by the V56 aircraft during DT II.

TABLE 22

SIKORSKY MISSION RELIABILITY - DT II

Aircraft	Mean-Time-Between-Mission Abort (Hrs)	Mission Reliability (1 Hr Mission)	Mission Reliability 90% Lower Confidence Bound
Sikorsky S50	21.6	.955	.920
Sikorsky S52	13.9	.931	.901
Sikorsky (Combined)	16.0	.939	.918

The mission reliability of the combined Boeing system was slightly higher than the combined Sikorsky system during DT II, but the difference was not significant.

Both contractors demonstrated the TRADOC interim test criteria of 0.90 mission reliability with 90 percent confidence.

2.1.2.3 OT II Performance. The mission reliability characteristics of the UTTAS prototypes during OT II are given in Tables 23 and 24. The estimate of the mission failure rate of GFE which was not installed during DT/OT II are included in the values below.

TABLE 23

BOEING MISSION RELIABILITY - OT II

Aircraft	Mean-Time-Between-Mission Abort (Hrs)	Mission Reliability (1 Hr Mission)	Mission Reliability 90% Lower Confidence Bound
Boeing V56	40.8	.976	.948
Boeing V57	28.9	.966	.936
Boeing (Combined)	34.2	.971	.953

TABLE 24

SIKORSKY MISSION RELIABILITY - OT II

Aircraft	Mean-Time-Between-Mission Abort (Hrs)	Mission Reliability (1 Hr Mission)	Mission Reliability 90% Lower Confidence Bound
Sikorsky S50	28.6	.966	.936
Sikorsky S52	25.1	.961	.929
Sikorsky (Combined)	26.6	.963	.943

There was no significant difference in the mission reliability characteristics demonstrated by the Boeing and Sikorsky systems during OT II.

The mission reliability achieved by both contractors in OT II was significantly higher than the mission reliability demonstrated in DT II. This is consistent with the overall system reliability improvement that was demonstrated by both contractors in OT II.

Again, both contractors demonstrated the TRADOC interim test criteria of 0.90 mission reliability with 90 percent confidence.

2.1.2.4 Mission Reliability Comparison With The UH-1H. Table 25 compares the mission reliability characteristics demonstrated by the UTTAS candidates during the last 200 hours of OT II with the mission reliability characteristics of a system of three UH-1H aircraft. The values for the UH-1H system were obtained from 611.5 hours of test data collected under the RAMLOG Data Collection System between June and December 1975.

TABLE 25

MISSION RELIABILITY - UTTAS VS. UH-1H

Aircraft System	Mean-Time-Between-Mission Abort (Hours)	Mission Reliability (1 Hr Mission)
Boeing (Combined)	28.6	.966
Sikorsky (Combined)	28.6	.966
UH-1H (Combined)	67.9	.985

The two UTTAS candidates demonstrated the same value for mission reliability during the last 200 hours of OT II. The UH-1H system achieved a significantly higher mission reliability than the UTTAS candidates.

2.1.2.5 Combat Mission Reliability. The estimates of UTTAS mission reliability during DT/OT II are considered conservative since they were dependent upon pilot judgment and safety considerations in a prototype test environment. Under these test conditions, the improved mission reliability that can be achieved with the redundancy of parallel systems cannot be adequately demonstrated.

In order to assess the potential of the UTTAS candidates in a combat environment, an evaluation has been made of the mission abort events in the DT/OT II environment which would also have aborted a mission in a combat situation. The corresponding combat mission reliability values for the UTTAS candidates during DT/OT II are contained in Tables 26 and 27. These values include a combat mission failure rate for GFE which was not installed during DT/OT II, (Appendix 5, Table 2).

TABLE 26

COMBAT MISSION RELIABILITY - DT II

Aircraft	Mean-Time-Between-Combat Mission Abort (Hrs)	Combat Mission Reliability (1 Hr Mission)	Combat Mission Reliability 90 Percent Lower Confidence Bound
Boeing V56	151.5	.993	.967
Boeing V57	36.5	.973	.951
Boeing (Combined)	50.6	.980	.967
Sikorsky S50	29.6	.967	.936
Sikorsky S52	26.7	.963	.938
Sikorsky (Combined)	27.7	.964	.947

TABLE 27

COMBAT MISSION RELIABILITY - OT II

Aircraft	Mean-Time-Between Combat Mission Abort (Hrs)	Combat Mission Reliability (1 Hr Mission)	Combat Mission Reliability 90 Percent Lower Confidence Bound
Boeing V56	72.2	.986	.962
Boeing V57	151.5	.993	.969
Boeing (Combined)	95.7	.9930	.977
Sikorsky S50	67.1	.985	.957
Sikorsky S52	71.1	.986	.961
Sikorsky (Combined)	69.1	.986	.972

An estimate of the combat mission reliability of three UH-1H aircraft has been similarly assessed from 611.5 hours of testing discussed in previous paragraphs. This estimate is compared in Table 28 with the assessment of the combat mission reliability of the UTTAS candidates during the last 200 hours of OT II.

TABLE 28

COMBAT MISSION RELIABILITY UTTAS VS. UH-1H

Aircraft System	Mean-Time-Between-Combat-Abort (Hours)	Combat Mission Reliability (1 Hr Mission)
Boeing (Combined)	86.2	.988
Sikorsky (Combined)	60.2	.984
UH-1H (Combined)	152.9	.993

The assessment of UH-1H combat mission reliability was significantly higher than either UTTAS system.

2.1.2.6 Analysis of Mission Abort Events - DT/OT II. A complete listing of the mission aborting events of the UTTAS candidates during DT/OT II and the corrective maintenance actions performed is provided in Appendix 11, Tables 1 and 2. Significant characteristics of these events will be described for each contractor in the summaries below.

2.1.2.6.1 Sikorsky Mission Abort Events - DT/OT II. Twenty-three mission aborts were assessed against the Sikorsky prototypes during DT/OT II. These do not include aborts caused by malfunctions of the GE YT700 engines. Eight of these aborts occurred in flight, while the remaining fifteen aborts occurred either during the pre-flight inspection or ground run-up. One-third of the mission aborts were caused by malfunctions in the flight control and hydraulic systems. The drive system also accounted for one-third of the mission aborts.

Three mission aborts were caused by failure of the rotor speed sensor. After each occurrence, the rotor speed sensor was replaced. No modification was incorporated on this component during DT/OT II. On two occasions in flight, all pressure was lost in the number two hydraulic system and the backup hydraulic pump. This was caused in each instance by four bolts which worked loose from a valve cover, resulting in loss of hydraulic fluid. After the second occurrence of this malfunction, the bolts were safety wired. This corrective action should effectively eliminate this failure mode. The main rotor blades were the cause of three mission aborts. One of these aborts has been assessed as a safety of flight affecting failure and is discussed further in paragraph 2.1.3.

2.1.2.6.2 Boeing Mission Abort Events - DT/OT II. Seventeen mission aborts were assessed against the Boeing prototypes during DT/OT II. This total does not include the mission aborts assessed against the GE YT700 engines. Ten of these aborts occurred on the ground and seven occurred while in flight. The drive system, which accounted for one-third of the mission aborts, had the highest mission affecting failure rate compared to other subsystems.

Severe vibrations in flight resulted in a Boeing mission abort during DT II, but subsequent troubleshooting could detect no malfunction in any system. Modifications have been incorporated on the pilot's and copilot's windshield and overhead corner window which were the cause of two mission aborts in DT/OT II.

2.1.2.6.3 General Electric YT700 Engine Mission Abort Events - DT/OT II. As mentioned previously, the General Electric YT700 engines, which were installed in the UTTAS candidates during DT/OT II, will be replaced by the GE T700 engines at production. The GE T700 engines are an improved configuration of the GE YT700 engine. The mission reliability

performance of the YT700 engines during DT/OT II was used to estimate a mission abort rate which the modified configuration of the T700 engine would have demonstrated during DT/OT II. In order to account for the improved design of the T700 engine, a mission abort was not assessed against the T700 engine if the abort was caused by a component on the YT700 engine which had been redesigned. In addition, only four of the nine aborts on the YT700 engine which were caused by diagnostic indicators were charged against the T700 configuration.

Under these criteria, ten aborts were assessed against the T700 engine during the 2216 total engine flight hours accumulated on all UTTAS prototypes during DT/OT II. This yields a mission abort rate of 0.005 for a single T700 engine, or a mission abort rate of 0.010 for two T700 engines in a series configuration. The mission abort rate of 0.010 for two T700 engines was included in the UTTAS mission reliability estimates during DT II and OT II. A description of the ten mission abort events assessed against the T700 engine is contained in Appendix 11.

Four of the ten aborts charged against the T700 engine were caused by magnetic chip light warnings. The magnetic chip detector gives warning of deterioration in components of the engine lubrication system by attracting metal particles in the engine oil to a magnetic plug. However, after each of the four chip light occurrences which caused misison aborts, only a small amount of metal contaminants were found on the magnetic plug. This was not considered sufficient evidence of abnormal deterioration of engine components.

The operator's manual for the GE YT700 engine during GCT advises engine shutdown if a chip light illuminates. Although the UTTAS has the capability to function adequately on one engine, the safety considerations which are necessary in a prototype test necessitated mission termination if a chip light on one engine illuminated. Under these procedures, false indications by the chip detection system could become a recurring source of mission aborts during further development testing.

2.1.2.7 Probability of Restoration. The probability of restoration is defined as the probability of restoring the aircraft to an operational status within 30 minutes after the occurrence of a potential mission aborting type event. In simpler terms, the probability of restoration may be considered as the percentage of potential mission abort type events which require less than 30 minutes to repair. The UTTAS FD/SC considers a potential mission aborting type event to be any malfunction discovered in a pre-flight inspection which requires maintenance prior to flight. In addition, all actual mission abort events are regarded as potential mission abort events.

TABLE 29

PROBABILITY OF RESTORATION - DT II

Aircraft	Number of Potential Mission Aborts	Number of Potential Mission Aborts Requiring Less Than 30 Min To Repair	Probability of Restoration
Boeing (Combined)	118	101	0.86
Sikorsky (Combined)	52	29	0.56

TABLE 30

PROBABILITY OF RESTORATION - OT II

Aircraft	Number of Potential Mission Aborts	Number of Potential Mission Aborts Requiring Less Than 30 Min To Repair	Probability of Restoration
Boeing (Combined)	138	126	0.91
Sikorsky (Combined)	31	23	0.74

During OT II, the Boeing combined system demonstrated the MN requirement of 0.90 for probability of restoration.

The Boeing prototypes had a total of 256 potential mission aborts during DT II and OT II. However, 196 of these potential mission aborts were unscheduled servicings of engine oil, transmission oil or hydraulic fluid which required less than 30 minutes of maintenance time. The Sikorsky aircraft had 83 potential mission aborts during DT II and OT II. Only 36 of these were unscheduled servicings requiring less than 30 minutes.

The high values which the Boeing prototypes demonstrated for probability of restoration are thus due primarily to the large number of unscheduled servicings which were required prior to flight.

Table 31 compares the probability of restoration of the UTTAS candidates if unscheduled servicings are not considered as potential abort type events.

TABLE 31

PROBABILITY OF RESTORATION - DT/OT II
(UNSCHEDULED SERVICINGS EXCLUDED)

Aircraft	Probability of Restoration DT II	Probability of Restoration OT II
Boeing (Combined)	.59	.37
Sikorsky (Combined)	.38	.47

Tables 32 and 33 compare the probability of restoration for the UTTAS candidates during the last 200 hours of OT II and the probability of restoration demonstrated by the UH-1H combined system of three aircraft during the 611.5 hours of testing discussed in previous sections. Unscheduled servicings are included in Table 32 and excluded in Table 33.

TABLE 32

PROBABILITY OF RESTORATION - UTTAS AND UH-1H COMPARISON
(INCLUDES UNSCHEDULED SERVICINGS)

Aircraft System	Probability of Restoration
Boeing (Combined)	.90
Sikorsky (Combined)	.78
UH-1H (Combined)	.71

TABLE 33

PROBABILITY OF RESTORATION - UTTAS AND UH-1H COMPARISON
(EXCLUDES UNSCHEDULED SERVICINGS)

Aircraft System	Probability of Restoration
Boeing (Combined)	.33
Sikorsky (Combined)	.50
UH-1H (Combined)	.67

2.1.3 Flight Safety Reliability.

2.1.3.1 General. A safety of flight affecting failure is a system failure which has actually caused an unsafe flight event resulting in an unintended landing or stoppage of test. The UTTAS Materiel Need document requires that the flight safety reliability be not less than 0.999952 for a one-hour mission. This translates to a mean time between safety of flight affecting failures of 20,833 hours.

At this point, each contractor was incurred one safety of flight affecting event. These events are described in the following paragraphs.

2.1.3.2 Details of Boeing Event. The Boeing safety of flight affecting event was incurred on 19 November 1975, during contractor testing when aircraft V56 crashed while demonstrating main rotor overspeed in autorotation. The main rotor tachometer is red-lined at 117 percent, but investigation determined that the main rotor speed (N_R) had reached approximately 123 percent when the tail rotor drive shaft failed.

The investigation also determined that at 123 percent N_R one segment of the tail rotor drive shaft whipped sufficiently far out of alignment to contact a portion of the fuselage structure. When that happened, the drive shaft failed. It is believed that 123 percent N_R represented a critical frequency for the tail rotor drive shaft. Consequently, Boeing has (since the crash) modified the tail rotor drive shaft to change its critical frequency. As a result of the crash, a main landing gear mount brake and the two YT700 engines sustained minor damage. Although the aircraft impacted oak trees up to 15 inches in diameter, all key fuselage components were found to be still in alignment. There were no injuries to personnel as a result of the crash.

2.1.3.3 Details of the Sikorsky Event. The Sikorsky safety of flight affecting event was incurred on 9 August 1976, approximately 190 hours into OT II testing, when aircraft S50 was forced to land due to a sudden occurrence of severe vibrations. The aircraft was carrying a mortar squad, flying a night, multiple ship, internal load, low level contour mission. At 300 to 350 feet above ground level (AGL) the aircraft developed extreme vibrations, making the aircraft uncontrollable for one pilot. With the co-piolt's assistance, control was regained just before decending into a heavily wooded area. The aircraft landed under full power chopping down pine trees from 4 to 6 inches in diameter. Prior to the development of the extreme vibrations, the aircraft had been flying smoothly. This event has been charged as a safety of flight affecting failure.

An investigation revealed that the vibration started when an area approximately 60" x 12" x5" of the outboard end of one of the main rotor blades broke away. As a result of tree strikes, the main rotor tip caps were severed and the tail rotor blades were damaged. No injuries to personnel or crew resulted from the forced landing. The aircraft was flown out of the forced landing area to the OT II field site on 11 August 1976, 6 hours and 10 minutes after it had been released to maintenance personnel.

On 14 August 1976, the Sikorsky contractor modified its UTTAS main rotor blades. This modification consisted of a fiberglass bonding doubler on the outboard end of the blade near the tip cap. Since installed, three of these bonding doublers have required contractor repair actions over a period of approximately 60 flight hours. It is not known at this time whether the Sikorsky contractor will initiate any other modifications in this area.

2.1.3.4 Flight Safety Reliability Estimates. Based on 1,362 total flight hours and one safety of flight affecting failure, an estimate for the Sikorsky UTTAS mean time between safety of flight affecting failures is 1,362 hours (flight safety reliability = 0.999266). Charging the Boeing safety of flight affecting event as a failure would give the Boeing UTTAS a mean time between safety of flight affecting failures estimate of 1,679 hours (flight safety reliability = 0.999405). Although the UH-1H's incurred no safety of flight affecting failure during testing, the mean time between safety of flight affecting failures demonstrated by the UH-1H fleet in FY75 was 12,945 hours (flight safety reliability = 0.999923). This estimate was based on 336,570 total flight hours in FY75 for the UH-1H fleet as specified in the AVSCOM Executive Summary Report (Reference 4).

The estimates for both contractors UTTAS candidates' flight safety reliability factors do not meet the required value of 0.999952. However, the flight safety reliability factor requirement is a design goal for the mature aircraft and, as stated in the UTTAS Decision Coordinating Paper, "These early tests cannot be used for statistical verifications of reliability but will provide early indications of design faults and will establish a basis for redesign and additional testing."

2.2 Maintainability.

2.2.1 General. Both UTTAS candidates have design features which will facilitate field maintenance. Some of these which have already proved valuable on the UH-1H are:

- Provisions for an aircraft mountable crane to allow removal and installation of major dynamic components in the field and

- Integral work platforms, steps and walkways to eliminate the need for ladders and maintenance scaffolds.

Other maintainability features of both contractors' prototypes which either exist to a lesser degree or are non-existent on the UH-1H are:

- Right to left interchangeability of redundant components to facilitate troubleshooting procedures and reduce the required test equipment,

- An onboard Auxiliary Power Unit (APU) which supplies power to all systems to allow pre-flight checks, maintenance inspections and adjustments without requiring operation of rotor systems or ground power units,

- Quick disconnects and modular components in the avionics; hydraulic and electrical systems to allow expeditious piece-part replacement without disrupting the remainder of the subsystem,

- Direct reading aircraft fluid indicators to facilitate inspections and

- Go-no-go Built In Test Equipment (BITE) to eliminate Time Between Overhaul (TBO) requirements on the monitored components in the avionics, engines and Stability Control Augmentation System.

In addition, the Boeing Vertol candidate includes an aircraft kneeling capability to facilitate maintenance and transportability.

2.2.2 Methodology. In both DT II and OT II, all maintenance actions were categorized according to the type of the mainteance task conducted and the subsystem upon which it was performed. These categories have been analyzed, and those areas requiring a disproportionate share of the maintenance have been highlighted. Regression analysis techniques were used to determine the best functional relationship between maintenance man-hours per flight hour and test time. Comparisons of the contractors' prototypes with the UH-1H and with MN, DCP and MAV requirements are based on results from the last 200 flight hours of OT II. All tests of significance were conducted at the $\alpha = 0.10$ confidence level.

Approximately 99 percent of the maintenance actions in DT II and OT II were performed on the aircraft at the AVUM or AVIM levels. Consequently, all calculated maintainability parameters are applicable only to AVUM/AVIM on aircraft maintenance.

2.2.3 Scheduled Maintenance.

2.2.3.1 DT II Results. Summaries of scheduled inspections on the Boeing and Sikorsky prototypes are presented in Tables 34 and 35.

TABLE 34

SCHEDULED INSPECTIONS ON BOEING AIRCRAFT V56 AND V57 DURING DT II

Type of Inspection	Number of Inspections	ACM Per Inspection (Hrs)	MMHD Per Inspection	MMHD Per Flight Hour
Pre-flight	191	0.38	0.72	0.44
Scheduled	39	0.33	0.36	0.05
THIR	25	1.70	2.12	0.17
Intermediate/ Minor Phase	5	2.72	3.95	0.06
Special	9	0.36	0.47	0.01
Post-flight	13	0.18	0.30	0.01
Enroute	43	0.14	0.26	0.04
Totals	325	0.47*	0.75*	0.78

NOTE: See page 11 for explanation of abbreviations used in the table.
*Weighted Average.

TABLE 35

SCHEDULED INSPECTIONS ON SIKORSKY AIRCRAFT S50 AND S52 DURING DT II

Type of Inspection	Number of Inspections	ACM Per Inspection (Hrs)	MMHD Per Inspection	MMHD Per Flight Hour
Pre-flight	259	0.32	0.55	0.47
Scheduled	73	0.18	0.20	0.05
Daily	88	1.24	1.75	0.50
Periodic/Major Phase	—	—	—	—
Special	12	0.18	0.17	0.01
Post-flight	9	0.13	0.19	0.01
Enroute	14	0.11	0.15	0.01
Totals	455	0.46*	0.70*	1.05

NOTE: See page 11 for explanation of abbreviations used in the table.
*Weighted Average.

Both contractors prescribe pre-flight inspection in their scheduled maintenance policies. These pre-flight inspections during DT II were conducted as often as five times per day per aircraft.

In lieu of a daily inspection, Boeing specified a Ten Hour Inspection Requirements (THIR) to be conducted every ten flight hours or five days, whichever came first. The Sikorsky policy during DT II was to inspect the aircraft daily.

The Boeing policy on periodic inspections provided for an Intermediate/Minor Phase inspection which required that each of ten distinct inspection phases be performed every 50 flight hours, thus completing the entire periodic inspection every 500 flight hours. The Sikorsky policy on periodic inspections was to perform one complete Periodic/Major Phase inspection every 500 flight hours.

The differences in the man-hours expended by each contractor on scheduled inspections during DT II were primarily due to the differences in maintenance policies. The 0.17 direct maintenance man-hours per flight hour expended on the Boeing THIR is approximately one-third the 0.50 direct maintenance man-hours per flight hour expended on the Sikorsky daily inspections. Also, Boeing performed five phased inspections which accounted for 0.06 direct maintenance man-hours per flight hour compared to no periodic inspections for Sikosrky, since the aircraft had not flown 500 hours. The 0.05 direct maintenance man-hours per flight hour for each contractor in the scheduled inspection category is utilized in taking transmission and gear box oil samples.

A summary of all scheduled maintenance (excluding modification work orders and mission profile changes) conducted during DT II is presented in Table 36.

TABLE 36

ALL SCHEDULED MAINTENANCE DURING DT II

Contractor	Number of Actions	ACM Per Action (Hrs)	MMHD Per Action	MMHD Per Flight Hour
Boeing	329	0.47	0.75	0.79
Sikorsky	496	0.46	0.69	1.12

NOTE: See page 11 for explanation of abbreviations used in the table.

The direct maintenance man-hours per flight hour for all scheduled maintenance is slightly larger than the direct man-hours per flight hour for scheduled inspections. The differences are primarily due to scheduled tests, servicings and adjustments. The detailed breakdowns of the DT II scheduled maintenance, according to subsystem and maintenance function, are presented in the Appendices.

Table 37 presents the total times (excluding modification work orders and mission profile changes) for which the aircraft were not mission available during DT II due to scheduled maintenance.

TABLE 37

ALL SCHEDULED MAINTENANCE DURING DT II FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE

Contractor	Number of Actions	Downtime Per Action (Hrs)	MMHD Per Action	Downtime Per Flight Hour (Hrs)
Boeing	4	2.00	2.31	0.03
Sikorsky	17	0.94	1.37	0.05

NOTE: See page 11 for explanation of abbreviations used in the table.

Although the downtime per flight hour for Sikorsky is higher than that of Boeing, the difference is not significant.

A decreasing trend in scheduled maintenance for both contractors was noted during DT II. This decrease in maintenance man-hours per flight hour during DT II is probably due to experience acquired by maintenance personnel throughout the test. Regression analysis showing these trends are presented in Figures 1 and 3 of Appendix 24.

2.2.3.2 OT II Results. Scheduled inspections performed on both contractors' prototypes during the last 200 hours of OT II are summarized in Tables 38 and 39.

TABLE 38

SCHEDULED INSPECTIONS ON BOEING AIRCRAFT V56 AND V57

Type of Inspection	Number of Inspections	ACM Per Inspection(Hrs)	MMHD Per Inspection	MMHD Per Flight Hour
Pre-flight	80	0.42	0.78	0.31
Scheduled	16	0.35	0.36	0.03
THIR	14	0.92	0.98	0.07
Intermediate/ Minor Phase	8	1.78	5.43	0.22
Special	6	0.42	0.40	0.01
Post-flight	6	0.05	0.07	0.00
Enroute	30	0.08	0.15	0.02
Total	160	0.45*	0.83*	0.66

*Weighted Average
NOTE: See page 11 for explanation of abbreviations used in the table.

TABLE 39

SCHEDULED INSPECTIONS ON SIKORSKY AIRCRAFT S50 AND S52

Type of Inspection	Number of Inspections	ACM Per Inspection(Hrs)	MMHD Per Inspection	MMHD Per Flight Hour
Pre-flight	63	0.35	0.63	0.20
Scheduled	50	0.19	0.19	0.05
Daily/THIR	32	0.83	1.05	0.17
Periodic/ Major Phase	1	11.30	17.24	0.09
Special	11	0.24	0.24	0.01
Post-flight	2	0.10	0.06	0.00
Enroute	3	0.13	0.18	0.00
Total	162	0.45*	0.64*	0.51

*Weighted Average
NOTE: See page 11 for explanation of abbreviations used in the table.

To evaluate maintenance man-hour requirements for periodic inspections, a complete Periodic/Major Phase Inspection was conducted on Sikorsky aircraft S52 prior to the specified 500 flight hour interval, and four additional phases of Boeing's Intermediate/Minor Phase Inspection were conducted on aircraft V57 prior to each of four 50 flight hour intervals. Consequently, the direct maintenance man-hours per flight hour associated with these inspections in Tables 38 and 39 are inflated. Dividing the total times for the complete Intermediate/Minor Phase or Periodic/Major Phase Inspections by 500 hours for both contractors yields 0.10 direct maintenance man-hours per flight hour for Boeing and 0.03 direct maintenance man-hours per flight hour for Sikosrky. In addition, Sikorsky switched from a policy of daily aircraft inspections to an Intermediate Ten Hour Inspection, a policy which is identical to Boeing's THIR. Of the 32 Sikorsky inspections classified as Daily/THIR, 17 were daily inspections and 15 were THIR. Had the THIR concept been implemented by Sikorsky for all of the last 200 hours, the direct maintenance man-hours per flight hour associated with these inspections would have been comparable with those observed for Boeing.

The total direct maintenance man-hours per flight hour and per inspection in Tables 38 and 30 are significantly different at the 90 percent confidence level. However, these differences are entirely due to the differences in the previously mentioned Periodic/Major Phase Inspection of Sikorsky and Intermediate/Minor Phase Inspection of Boeing.

Table 40 presents comparisons of all scheduled maintenance (excluding modification work orders and mission profile changes) in the last 200 hours of OT II with the corresponding characteristics of the UH-1H. The scheduled maintenance parameters of Boeing and Sikorsky have been adjusted to reflect the previously discussed corrections to the direct maintenance man-hours per flight hour associated with Periodic/Major Phase and Intermediate/Minor Phase Inspections. In addition, the par value of 0.15 direct maintenance man-hours per flight hour for GFE not yet installed on the aircraft has been incorporated in the Boeing and Sikorsky totals. These totals include only AVUM/AVIM on aircraft maintenance.

TABLE 40

ALL SCHEDULED MAINTENANCE OF BOEING AND SIKORSKY PROTOTYPES COMPARED WITH THE UH-1H

	Boeing	Sikorsky	UH-1H
Total Scheduled Maintenance Man-hours Direct Per Flight Hour	0.75	0.72	1.24

The UTTAS Materiel Need (MN) and Decision Coordinating Paper (DCP) (References 1 and 2) specify that no more than 1.0 maintenance man-hours per flight hour shall be required for scheduled inspections and servicings. The UTTAS Memorandum of Agreement (MOA) on Minimum Acceptable Values (MAV) (Appendix 4) specifies a maximum of 2.17 man-hours per flight hour for scheduled inspections and servicings. The results in Table 40 indicate that both contractors have easily met the MN, DCP and MAV requirements. In addition, both contractors have achieved approximately a forty percent reduction in the scheduled maintenance burden compared with that of the UH-1H.

Detailed breakdowns according to maintenance function and subsystems of all scheduled maintenance during the last 200 hours of DT II are presented in the Appendices.

Total scheduled maintenance times for which both contractors' prototypes were not mission available (excluding modification work orders and mission configuration changes) during the last 200 hours of OT II are compared with the comparable parameters for the UH-1H and presented in Table 41.

TABLE 41

BOEING AND SIKORSKY SCHEDULED MAINTENANCE FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE COMPARED WITH THE BELL UH-1H

Contractor	Number of Actions	Downtime Per Action (Hrs)	MMHD Per Action	Downtime Per Flight Hour (Hrs)
Boeing	2	1.80	4.02	0.02
Sikorsky	9	2.34	3.45	0.10
Bell*	170	0.80	1.08	0.22

*Determined from AMSAA assessment of UH-1H data base.
NOTE: See page 11 for explanation of abbreviations used in table.

The large number of scheduled maintenance actions downing the UH-1H are due to the higher frequency of scheduled component inspections in the UH-1H maintenance policy relative to both UTTAS candidates.

Detailed breakdowns of these maintenance actions according to subsystem and maintenance function are presented in the Appendices.

An increasing trend in scheduled maintenance for both contractors was noted during OT II. However, this trend was due primarily to the performance of Sikorsky's Periodic/Major Phase Inspection and four additional phases of Boeing's Intermediate/Minor Phase Inspection near the end of OT II. A minor contribution to this trend was a slight increase in the frequency of special inspections at the end of OT II. Excluding the special and periodic inspections yielded a slightly decreasing trend for Sikorsky and a slightly increasing trend for Boeing. Regression analyses showing these trends are presented in the Appendices.

2.2.4 Unscheduled Maintenance.

2.2.4.1 DT II Results. A summary of all unscheduled maintenance on the Boeing and Sikorsky prototypes is presented in Table 42.

TABLE 42

UNSCHEDULED MAINTENANCE ON THE BOEING AND SIKORSKY PROTOTYPES DURING DT II

Contractor	Number of Maintenance Actions	ACM Per Maintenance Action (Hrs)	MMHD Per Maintenance Action	MMHD Per Flight Hour
Boeing	629	0.66	1.00	2.02
Sikorsky	400	0.64	0.93	1.22

NOTE: See page 11 for explanation of abbreviations used in table.

The unscheduled direct maintenance man-hours per flight hour for the Boeing aircraft is significantly greater than that of Sikorsky. Table 43 presents those subsystems on both contractors' prototypes which required the greatest amount of unscheduled maintenance.

TABLE 43

BOEING AND SIKORSKY SUBSYSTEMS REQUIRING GREATEST QUANTITY OF UNSCHEDULED MAINTENANCE DURING DT II

Subsystem	Boeing Number of Maintenance Actions	Boeing MMHD Per Flight Hour	Sikorsky Number of Maintenance Actions	Sikorsky MMHD Per Flight Hour
Airframe	97	0.31	52	0.12
Power Plant & Pneumatic Sys	52	0.11	47	0.15
Drive System	239	0.54	55	0.23
Hydraulic	49	0.11	46	0.13
Instrumentation	19	0.12	18	0.01
Electrical	38	0.11	42	0.09
Flight Controls	8	0.03	35	0.21
Auxiliary Power Unit (APU)	24	0.10	0	0.00
Avionics	50	0.41	28	0.10

NOTE: See page 11 for explanation of abbreviations used in table.

The Boeing Airframe, Drive System, Instrumentation, APU and Avionics subsystems required 1.48 direct maintenance man-hours per flight hour compared with 0.46 direct maintenance man-hours per flight hour for these subsystems on the Sikorsky prototypes. This difference is significant. The Sikorsky Flight Controls subsystem required 0.21 direct maintenance man-hours per flight hour, significantly higher than the 0.03 for Boeing.

Table 44 shows the five Boeing subsystems from Table 43 which compared unfavorably with Sikorsky. Results are presented for each aircraft.

TABLE 44

BOEING SUBSYSTEMS REQUIRING A DISPROPORTIONATE SHARE OF UNSCHEDULED MAINTENANCE RELATIVE TO SIKORSKY

Subsystem	Aircraft V56		Aircraft V57	
	Number of Maintenance Actions	MMHD Per Flight Hour	Number of Maintenance Actions	MMHD Per Flight Hour
Airframe	30	0.14	67	0.41
Drive System	50	0.19	187	0.74
Instrumentation	7	C.05	12	0.17
Auxiliary Power Unit (APU)	15	0.05	9	0.12
Avionics	13	0.11	37	0.59

NOTE: See page 11 for explanation of abbreviations used in table.

The airframe, drive system and avionics subsystems of aircraft V57 required four times as much unscheduled maintenance as those of V56. When the 0.44 unscheduled direct maintenance man-hours per flight hour expended on these subsystems on aircraft V56 is compared with the 0.45 unscheduled maintenance man-hours per flight hour expended on the same subsystems on both Sikorsky aircraft, there is no significant difference. Detailed breakdowns of all unscheduled maintenance according to subsystem and maintenance function are presented in the Appendices.

All unscheduled maintenance for which both contractors' prototypes were not mission available during DT II is presented in Table 45. Boeing downtime was significantly higher than that of Sikorsky.

TABLE 45

BOEING AND SIKORSKY UNSCHEDULED MAINTENANCE DURING DT II FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE

Contractor	Number of Actions	Downtime Per Action (Hrs)	MMHD Per Action	Downtime Per Flight Hour (Hrs)
Boeing	99	1.65	2.90	0.52
Sikorsky	112	1.01	1.51	0.37

NOTE: See page 11 for explanation of abbreviations used in table.

For both contractors, the drive system was the largest contributor to downtime per flight hour. The Boeing and Sikorsky drive systems accounted for 0.22 and 0.10 hours of downtime per flight hour,r respectively for unscheduled maintenance. Additional details are in Appendices 13 and 19.

An increasing trend in unscheduled maintenance for both contractors was noted during DT II. Regression analyses showing these trends are presented in Figures 2 and 4 of Appendix 24.

2.2.4.2 OT II Results. A summary of all unscheduled maintenance on the Boeing and Sikorsky prototypes during the last 200 hours of OT II is compared with that of the Bell UH-1H in Table 46.

TABLE 46

UNSCHEDULED MAINTENANCE ON THE BOEING AND SIKORSKY PROTOTYPES COMPARED WITH THE BELL UH-1H

Contractor	Number of Maintenance Actions	ACM Per Maintenance Actions (Hrs)	MMHD Per Maintenance Action	MMHD Per Flight Hour
Boeing	253	0.47	0.74	1.16*
Sikorsky	192	0.72	1.16	1.32*
Bell UH-1H	624	0.58	0.85	0.87

*Includes the par value of 0.22 MMHD/FH for FGE not yet installed.

NOTE: See page 11 for explanation of abbreviations used in table.

The direct maintenance man-hours per flight hour for the Bell UH-1H is significantly less than that observed for both UTTAS contractors. The difference between Boeing and Sikorsky was not significant. Also, the Boeing and Sikorsky direct maintenance man-hours per flight hour during the last 200 hours of OT II is significantly better than that observed during DT II. These reductions in each contractor's maintenance burden are consistent with the system reliability improvement demonstrated by each contractor during OT II.

Table 47 presents the Boeing, Sikorsky and Bell UH-1H subsystems which required the greatest quantity of unscheduled maintenance.

TABLE 47

BOEING AND SIKORSKY SUBSYSTEMS REQUIRING THE GREATEST QUANTITY OF UNSCHEDULED MAINTENANCE COMPARED WITH THE UH-1H

Subsystem	BOEING		SIKORSKY		UH-1H	
	Number of Maintenance Actions	MMHD Per Flight Hour	Number of Maintenance Actions	MMHD Per Flight Hour	Number of Maintenance Actions	MMHD Per Flight Hour
Airframe	29	0.10	38	0.25	117	0.14
Power Plant & Pneumatic Sys	13	0.01	14	0.07	71	0.08
Drive System	117	0.26	51	0.35	165	0.30
Hydraulic	28	0.21	7	0.01	15	0.01
Instrumentation	9	0.06	1	0.00	23	0.01
Electrical	12	0.10	16	0.04	51	0.06
Flight Controls	4	0.03	14	0.28	60	0.12
Auxiliary Power Unit (APU)	8	0.05	0	0.00	—	—
Avionics	12	0.02	13	0.06	36	0.03

NOTE: See page 11 for explanation of abbreviations used in table.

The direct maintenance man-hours per flight hour for each of the Boeing airframe, power plant, drive and avionics subsystems during the last 200 hours of OT II is significantly less than those observed for the corresponding subsystems during DT II. The man-hours per flight hour for the hydraulic subsystem during the last 200 hours of OT II was significantly greater for Boeing and significantly smaller for Sikorsky than those observed during DT II. The direct man-hours per flight hour on the Sikorsky airframe and drive systems each was significantly higher during the last 200 hours of OT II than in DT II. Also, the frequencies of unscheduled maintenance for the Boeing airframe, power plant, drive, electrical, APU and avionics subsystems during the last 200 hours of OT II each was significantly smaller than the unscheduled maintenance frequencies for these same subsystems during DT II. For Sikorsky, the frequencies of unscheduled maintenance for each of the power plant, hydraulic, instrumentation, electrical, flight controls and avionics subsystems during the last 200 hours of OT II was significantly smaller than those observed for the corresponding subsystems during DT II. Further details of unscheduled maintenance are listed in the Appendices.

All unscheduled maintenance for which both contractors' prototypes were not mission available during the last 200 hour of OT II are compared with the UH-1H in Table 48.

TABLE 48

UNSCHEDULED MAINTENANCE DURING THE LAST 200 HOURS OF OT II FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE COMPARED WITH THE UH-1H

Contractor	Number of Actions	Downtime Per Actions (Hrs)	MMHD Per Action	Downtime Per Flight Hour (Hrs)
Boeing	55	1.48	2.49	0.41
Sikorsky	77	1.04	1.73	0.40
Bell UH-1H	432	0.69	1.04	0.49

NOTE: See page 11 for explanation of abbreviations used in table.

There is no significant difference in downtime per flight hour due to unscheduled maintenance between the three aircraft contractors. The drive system contributed the greatest portion of downtime for all three contractors. Hours of downtime per flight hour for unscheduled maintenance on the drive system were 0.13, 0.16 and 0.16 for Boeing, Sikorsky and Bell, respectively. Further details are presented in the Appendices.

Table 49 presents the fault corrective maintenance burden required to correct independent and dependent failures during the last 200 hours of OT II.

TABLE 49

MAINTENANCE REQUIRED TO CORRECT ALL DEPENDENT AND INDEPENDENT FAILURES DURING THE LAST 200 HOURS OF OT II

Contractor	Number of Events	ACM Per Event (Hrs)	MMHD Per Event	MMHD Per Flight Hour
Boeing	61	1.49	2.35	0.90*
Sikorsky	93	1.23	1.99	1.10*

*Includes the par value of 0.18 MMHD/FH for GFE.
NOTE: See page 11 for explanation of abbreviations used in table.

The direct maintenance man-hours per flight hour in Table 49 includes fault location time. The AMSAA position is that fault location time is a major portion of fault corrective maintenance and should be included. Even with fault location time included in the fault corrective maintenance man-hour per flight hour ratio, both contractors easily met the MN and DCP maturity requirement of 2.8 maintenance man-hours per flight hour and the MAV of 8.0 maintenance man-hours per flight hour.

A slightly increasing trend in unscheduled maintenance man-hours per flight hour for both contractors was noted during OT II. Regression analysis showing these trends are presented in Figures 3 and 4 of Appendix 25.

2.2.5 Total Maintenance.

2.2.5.1 DT II Results. Table 50 presents combined scheduled and unscheduled maintenance (excluding modification work orders and mission configuration change) for the Boeing and Sikorsky prototypes during DT II.

TABLE 50

TOTAL SCHEDULED AND UNSCHEDULED MAINTENANCE FOR THE BOEING AND SIKORSKY PROTOTYPES

Contractor	Number of Maintenance Actions	ACM Per Action	MMHD Per Action	MMHD Per Flight Hour
Boeing	958	0.59	0.91	2.81
Sikorsky	896	0.54	0.80	2.34

NOTE: See page 11 for explanation of abbreviations used in table.

The Sikorsky maintenance man-hours per flight hour was significantly less than that of Boeing.

2.2.5.2 OT II Results. Table 51 compares the combined scheduled and unscheduled maintenance (excluding modification work orders and mission configuration changes) for the Boeing and Sikorsky prototypes during the last 200 hours of OT II with that of the Bell UH-1h.

TABLE 51

TOTAL SCHEDULED AND UNSCHEDULED MAINTENANCE FOR THE BOEING AND SIKORSKY PROTOTYPES COMPARED WITH THE BELL UH-1H

Contractor	Number of Maintenance Actions	ACM Per Action	MMHD Per Action	MMHD Per Flight Hour
Boeing	417	0.47	0.80	1.91*
Sikorsky	394	0.58	0.89	2.04*
Bell	1605	0.54	0.80	2.10

*Includes the par value of 0.37 MMHD/FH for total maintenance of GFE not yet installed and adjustment for periodic inspections.

NOTE: See page 11 for explanation of abbreviations used in table.

The total maintenance man-hours per flight hour of Boeing was significantly less than that of Bell but was not significantly different from that of Sikorsky. The Sikorsky maintenance man-hours per flight hour was not significantly different from that of Bell.

Both Boeing and Sikorsky met the DCP maturity goal of 3.8 maintenance man-hours per flight hour and the interim goal of 4.8 maintenance man-hours per flight hour.

2.3 Availability.

2.3.1 General. Availability is a result of the reliability and maintainability characteristics of a system. Inherent availability includes only those items of the system design which are normally design controllable. Achieved availability takes into account all downtime for which the contractor can be held responsible. This includes only active maintenance time during which the aircraft is not mission available due to preventive maintenance or unscheduled maintenance. Operational availability takes into account administrative delays, personnel delays, and supply delays. These times depend upon the deployment and logistic support in the field environment and thus are not demonstrated during testing. All availability calculations below are based upon a 730 hour calendar month with an aircraft utilization rate of 69 flight hours per month.

2.3.2 Inherent Availability. Inherent availability, A_i, is a measure only of the intrinsic design variable controllable by the system designer. The only downtime considered in its calculation is that chargeable active unscheduled maintenance time during which the aircraft is not mission available. This downtime includes corrective maintenance time required to restore the aircraft to operational status after the occurrence of a mission abort type failure. In addition, it includes the time to repair other system failures if the maintenance performed causes the aircraft to be placed in a condition which removes the aircraft from flight ready status. Other minor unscheduled maintenance actions such as adjustments and servicing actions are not counted. Downtime due to cannibalization, mission profile changes and modification work orders is excluded.

Analysis of test data from approximately the last 200 hours of OT II and the UH-1H RAMLOG data base yields the results in Table 52 below. The values presented here include 0.06 hours of downtime per flight hour for GFE not yet installed.

TABLE 52

INHERENT AVAILABILITY

Contractor	Flight Hours	Downtime Per FH (Hrs)	Inherent Availability
Sikorsky	202.5	.46	.957
Boeing	199.9	.46	.957
Bell	611.5	.41	.962

The System Specification requires that the inherent availability be at least 0.97. This corresponds to a chargeable downtime ratio of 0.32 hours per flight hour. The Boeing Prime Item Development Specification (PIDS) specifies the same value; however, the Sikorsky PIDS contain a requirement for an inherent availability of 0.985. Reaching that goal requires a reduction of the chargeable downtime ratio of 0.16 hours per flight hour. The data indicate that this is an overly optimistic goal.

The tables above indicate that the two UTTAS candidates are currently very close in regard to inherent availability. A reduction of abour thirty percent in downtime due to unscheduled maintenance is needed to meet the specified value of 0.97. Attainment of this goal should be possible because of planned fixes of observed failure modes and the reduction in maintenance task times which will come with experience.

2.3.3 Achieved Availability. Achieved availability is a measure of the availability of a system in an ideal support environment. In addition to unscheduled maintenance downtime, it accounts for any preventive maintenance actions which would make the aircraft not ready to perform a mission. As in the calculation of inherent availability, downtime due to cannibalization, mission profile changes, and modification work orders is excluded.

The achieved availability of the Sikorsky and Boeing UTTAS candidates and that of the Bell UH-1H is presented in the following table.

TABLE 53

ACHIEVED AVAILABILITY

Contractor	Flight Hours	Downtime Per FH (Hrs)	Achieved Availability
Sikorsky	202.5	.56	.947
Boeing	199.9	.48	.955
Bell	611.5	.71	.933

Analysis of these tables indicates that the UH-1H requires a larger amount of preventive maintenance which precludes the aircraft from flight than either of the UTTAS candidates. The UTTAS should provide a 20 to 35 percent reduction in downtime due to maintenance.

The System Specification requires that achieved availability be at least 0.92. In conjunction with the inherent availability requirement, this requires the downtime for scheduled maintenance to be less than 0.5[illegible] hours per flight hour. The differences in downtime per flight hour between Tables 52 and 53 indicate that the Boeing maintenance policy results in 0.02 hours of scheduled downtime per flight hour while the Sikorsky policy results in a scheduled downtime of 0.10 hours per flight hour.

2.3.4 Operational Availability. Operational availability is estimated by adding downtimes for administrative delays, personnel delays, and supply delays to the downtime used in computation of achieved availability. The Memorandum of Agreement on MAV (Appendix 4) specifies that the Not Operationally Ready Supply (NORS) rate used in demonstration of operational availability is to be 8 percent. Information received from field units indicates that delays due to queuing and/or upon availability of personnel should cause at most a 50 percent increase in maintenance downtime. This figure is used to estimate the Not Operationally Ready Maintenance (NORM) rate. Taking this factor and the specified NORS rate results in the operational availability estimates shown in Table 54.

TABLE 54

OPERATIONAL AVAILABILITY

Contractor	NORM %	NORS %	Downtime Per FH (Hrs)	Operational Availability
Sikorsky	8.0	8.0	1.69	0.840
Boeing	6.9	8.0	1.57	0.851
Bell	10.1	8.0	1.91	0.819

Although the MN (Reference 1) states that operational availability pertains only to the probability that a single aircraft is in an operable and committable state when a mission is called for at a random point in time, this term is often used interchangeably with operational readiness. Operational readiness is calculated from aircraft status data reported on DA Form 2408-3 and DA Form 1352. Monthly field reports provide rates for Not Operationally Ready Maintenance (NORM) and Not Operationally Ready Supply (NORS). The UH-1H Assessment and Comparative Fleet Evaluation (Reference 4) contains data of the utilization of the fleet of 3208 UH-1H aircraft in CY 74. Operationally readiness figures are based on the operationally assigned aircraft which comprise 81.4 percent of the fleet. The UH-1H is reported to spend the following fraction of time in each of the three categories: (1) Operationally Ready (OR), 75.5 percent; (2) Not Operationally Ready Supply (NORS) 7.2 percent; and (3) Not Operationally Ready Maintenance (NORM) 17.3 percent. When compared to the amount of maintenance downtime observed during the RAMLOG sampling of the UH-1H, the 17.3 percent NORM rate appears to be excessively large. The difference of 7.2 percentage points cannot be explained at this time.

There is no interim test value for operational availability. Due to the uncertainty of delay time which reduce operational availability, this parameter should not be used as a rigid test criterion. Inherent availability and achieved availability, as defined in the approved revision of AR 702-3 (Reference 5) should be used for test purposes. The MN requirement of 0.82 for operational availability should be met if there are no large amounts of unexplained downtime as have been reported for the UH-1H Fleet Assessment.

2.4 Durability.

2.4.1 General. Durability, which is a special case of reliability, is the probability that a system or major component will survive to its projected service life, overhaul point, or rebuild point without a durability failure. A durability failure is considered to be a malfunction that precludes further operation of the item and is great enough in

cost, safety, or time to restore, that the item must be replaced or rebuilt. AR 702-3 (Reference 5) points out that durability requirements relate primarily to logistic burden and life cycle cost.

2.4.2 Mean Time Between Removals (MTBR) of Dynamic Components. The MN (ED) (Reference 1) defines dynamic components as those rotating and non-rotating items in the drive train and rotor(s) control with associated bearings, seals, and vibration absorbers. That document requires that the MTBR be not less than 1500 flight hours for scheduled or unscheduled maintenance. The UTTAS is designed for an on-condition maintenance policy, that is, there are no scheduled removals for overhaul of components. Removals caused by bearing failures, seal leakage, special inspection, lubrication replenishment, and replacement of parts are accountable for purposes of this requirement. Hostile and crew induced maintenance actions are not accountable. The systems specification further excludes removals for modifications, cannibalization, or to facilitate other on-aircraft maintenance.

2.4.3 Removals During DT/OT II. The DT/OT II calculations of MTBR considered as a basis all maintenance actions requiring removal and replacement of any part with a like part. Each removal was classified as either an inherent one, i.e., inherent to the aircraft design or an induced one. Induced removals are those resulting from maintenance error, foreign object damage, operation of aircraft beyond specified limits and those removals for supply/convenience and time between overhaul. Replacements due to crash/accident damage are not included. Within each of these categories, removals were classified as either a major or minor item and dynamic components, which comprise the majority of the major items, were identified. Tables 55 and 56 list the MTBR's of major items and dynamic components for each UTTAS candidate based on DT/OT II test results. Table 57 lists removals observed on the UH-1H during the RAMLOG sampling. Table 58 represents the inherent MTBR's of major items and dynamic components found in the UTTAS/UH-1H Operating and Support Cost R And M Factors Study (Reference 6). Improved estimates of MTBR's from the Boeing/Sikorsky DT/OT II test results can be obtained only through continued testing. The lower bounds can then be expected to increase. DT/OT II test results show that inherent replacements of dynamic components accounted for approximately 90 percent of all major items removed on the Boeing aircraft and approximately 50 percent for Sikorsky. For the Boeing aircraft 278.3 maintenance man-hours were expended for inherent dynamic component removals out of a total of 571.1 maintenance man-hours for all inherent removals. The Sikorsky aircraft required 140.9 maintenance man-hours for inherent dynamic component removals out of a total of 368.2 maintenance man-hours for all inherent removals. It should be noted that for Sikorsky aircraft approximately 46 percent of the inherent dynamic component removals were minor items, whereas minor items accounted for only 14 percent of Boeing Vertol's total inherent dynamic component removals. Tables 1, 2 and 3 of Appendix 29 list by subsystem all removals on the YUH-60A, YUH-61A, and the UH-1H during DT/OT II and for the UH-1H RAMLOG sample period.

2.4.4 Removals During Contractor Testing (PQT-C). Tables 59 and 60 present the number of inherent removals of major/dynamic components during the Boeing Vertol 758 hour contractor test and a portion of Sikorsky's 555 hour contractor test. Sikorsky's data remain incomplete since test data after August 1975 are not available. The failure modes responsible for some of the removals observed during PQT-C have been eliminated or reduced in frequency. In particular for the Boeing YUH-60A removal rates decreased for the main rotor hub, pneumatic starter, and tail rotor driveshaft. Sikorsky made improvements on the main rotor blade, tail rotor blade, and intermediate gearbox.

2.4.5 Airframe Overhaul. The system specification prescribes that the airframe shall be designed so as not to require major overhaul in less than 4500 flight hours. Flight testing during the contractor phase and DT/OT II was not adequate to provide a good estimate of the likelihood of meeting this goal. The Boeing PIDS states that the YUH-61A will have a MTBO of 4500 hours; however, the Sikorsky PIDS asserts that the YUH-60A will be designed so as not to require an airframe overhaul in less than 8000 flight hours.

Information available for use in DCP No. 13 showed that the UH-1H required an overhaul at intervals averaging 3300 flight hours. An AVSCOM special study, Cyclic Data Analysis - UH-1H, conducted in 1972, showed that during the Vietnam conflict, UH-1H helicopters were returned for overhaul after about 2200 flight hours. The UTTAS design requirement, therefore, represents a 30 percent to over 100 percent increase in time between overhauls.

TABLE 55 MAJOR/DYNAMIC COMPONENT MEAN TIME BETWEEN REMOVALS FOR COMBINED SIKORSKY YUH-60A S50 AND S52 DURING DT/OT II BASED ON 557.0 FLIGHT HOURS

MAJOR ITEMS	DYNAMIC COMPONENT	QTY A/CFT	INHERENT REMOVALS	MTBR, HOURS (PT. ESTIMATE)	MTBR, HOURS (90% LOWER BOUND)
Main Rotor Hub	X	1	0	—	242
Main Rotor Blade	X	4	3	743	333
Tail Rotor Gearbox	X	1	0	—	242
Intermediate Gearbox	X	1	0	—	242
Main Transmission	X	1	0	—	242
Main Transmission Input Module	X	2	0	—	483
Accessory Module of Main Transmission	X	2	0	—	483
Upper Control Assembly	X	1	0	—	242
Tail Rotor Hub & Blade	X	2	2	557	210
Tail Rotor Driveshaft Damper Bearings	X	3	0	—	725
Starter		2	7	159	95
Generator		3	3	557	249
Main Rotor Actuator (Servo-Cylinder)	X	3	1	1671	430
Auxiliary Power Unit	X	1	2	279	143
Hot Section Module		2	0	—	483
Accessory Section Module		2	0	—	483
Power Turbine Module		2	0	—	483
Hydromechanical Unit		2	1	1114	286
Electrical Control Unit		2	0	—	483
Blower		2	0	—	483
Engine	X	2	2	570	210

NOTE: See page 11 for explanation of abbreviations used in the table.
SOURCE: Reference Major Components

TABLE 56 MAJOR/DYNAMIC COMPONENT MEAN TIME BETWEEN REMOVALS FOR COMBINED BOEING YUH-61A V56 AND V57 DURING DT/OT II BASED ON 570.9 FLIGHT HOURS

MAJOR ITEMS	DYNAMIC COMPONENT	QTY ACFT	INHERENT REMOVALS	MTBR, HOURS (PT. ESTIMATE)	MTBR, HOURS (90% LOWER BOUND)
Main Rotor Hub	X	1	2	286	108
Main Rotor Blade	X	4	1	2284	587
Tail Rotor Gearbox	X	1	0	—	248
Intermediate Gearbox	X	1	0	—	248
Main Transmission	X	1	0	—	248
Engine Gearbox	X	2	0	—	495
Forward Auxiliary Gearbox	X	1	0	—	248
Upper Control Assembly (Swashplate)	X	1	0	—	248
Tail Rotor Flex Straps	X	2	0	—	495
Tail Rotor Blade	X	4	1	2284	587
Tail Rotor Driveshaft Damper Bearings	X	4	0	—	991
Starter		2	0	—	495
Generator		2	0	—	495
Main Rotor Actuator (Servo Cylinder)	X	3	1	1713	440
Auxiliary Power Unit	X	1	0	—	248
Hot Section Module		2	0	—	495
Accessory Section Module		2	0	—	495
Power Turbine Module		2	0	—	495
Hydromechanical Unit		2	1	1142	294
Electrical Control Unit		2	1	1142	294
Blower		2	0	—	495
Engine	X	2	8	143	88
Scasbox	X	1	1	571	147

NOTE: See page 11 for explanation of abbreviations used in the table.
SOURCE: Reference Major Components

TABLE 57 MAJOR/DYNAMIC COMPONENT MEAN TIME BETWEEN REMOVALS FOR COMBINED BELL UH-1H B32, B48 AND B72 BASED ON 611.5 FLIGHT HOURS

MAJOR ITEMS	DYNAMIC COMPONENT	QTY ACFT	INHERENT REMOVALS	MTBR, HOURS (PT. ESTIMATE)	MTBR, HOURS (90% LOWER BOUND)
Turbine Engine	X	1	0	—	451
Fuel Control Valve		1	0	—	451
Main Rotor Blade	X	2	1	1223	314
Scissors and Sleeve	X	1	0	—	451
Swashplate and Support	X	1	0	—	451
Main Transmission	X	1	0	—	451
Tail Rotor Blade	X	2	0	—	531
Tail Rotor Gearbox (90°)	X	1	1	612	157
Intermediate Gearbox (45°)	X	1	2	306	115
Tail Rotor Hub	X	1	0	—	451
Hanger Bearings	X	4	0	—	1061
MAST	X	1	0	—	451
Damper Assembly	X	2	0	—	548
Driveshaft Engine to Transmission	X	1	0	—	451
Starter/Generator		1	0	—	451
Main Quill	X	1	0	—	451
Main Rotor Hub	X	1	0	—	451
Main Rotor Actuator (Servo Cylinders)	X	3	0	—	823
Hydraulic and Tach Quill		1	0	—	451
Generator Quill		1	0	—	451

NOTE: See page 11 for explanation of abbreviations used in the table.

TABLE 58 UH-1H MAJOR ITEM, DYNAMIC COMPONENT REPLACEMENT TIMES

MAJOR ITEMS	DYNAMIC COMPONENT	QUANTITY AIRCRAFT	INHERENT, MTBR, HOURS
Turbine Engine	X	1	840
Fuel Control Valve		1	356
Main Rotor Blade	X	2	845
Scissors and Sleeve	X	1	413
Swashplate and Support	X	1	543
Main Transmission	X	1	3274
Tail Rotor Blade	X	2	910
Tail Rotor Gearbox (90^{o})	X	1	1255
Intermediate Gearbox (45^{o})	X	1	1418
Tail Rotor Hub	X	1	392
Hanger Bearings	X	4	771
MAST	X	1	348
Damper Assembly	X	2	831
Driveshaft Engine to Transmission	X	1	641
Starter/Generator		1	1461
Main Quill	X	1	1555
Main Rotor Hub	X	1	1236
Main Rotor Actuator (Servo Cylinder)	X	3	956
Hydraulic and Tach Quill		1	472
Generator Quill		1	3164

TABLE 59

BOEING CONTRACTOR TEST RESULTS DURING 758 FLIGHT HOURS

Major Items	Dynamic Component (x)	Number of Inherent Removals
Main Rotor Hub	X	4
Main Rotor Blade	X	1
Tail Rotor Flex Straps	X	2
Tail Rotor Blade	X	2
Tail Rotor Driveshaft	X	3
Engine Driveshaft	X	1
Transmission Quillshaft	X	1
Main Transmission	X	1
Engine Transmission	X	1
Flight Control Actuator	X	2
Pneumatic Starter		22
Hydromechanical Unit		10
Electrical Control Unit		3
Engine	X	18
Main Rotor Transmission	X	1
Total Major Removals		72

Dynamic Component Removals		Total Dynamic Component Removals
Major Components	Minor Components	
37	123	160

TABLE 60

SIKORSKY CONTRACTOR TEST REMOVALS DURING 330 FLIGHT HOURS

Major Items	Dynamic Components	Number of Inherent Removals
Main Rotor Blade	X	18
Tail Rotor Blade	X	6
Tail Rotor Hub	X	1
Intermediate Gearbox	X	1
Tail Rotor Gearbox	X	4
Engine Starter		5
Hydromechanical Unit		7
Electrical Control Unit		2
Blower		1
Engine	X	2
Total Major Removals		47

Dynamic Component Removals		Total Dynamic Component Removals
Major Components	Minor Components	
37	40	77

3. CONCLUSIONS

3.1 General.

At the present stage of development, the Boeing UTTAS has met all DCP interim RAM thresholds and all minimum acceptable values. The Sikorsky UTTAS has met all minimum acceptable values and all but one of the DCP interim RAM thresholds. In addition, several MN and DCP maturity goals were demonstrated during the last 200 hours of OT II. In comparison with the UH-1H, the UTTAS candidates achieved a significantly higher system reliability and operational availability. The scheduled and total maintenance man-hour per flight hour ratios for the UTTAS candidates were also lower than those of the UH-1H. The RAM performance of the UTTAS candidates in comparison with MN and DCP requirements and the UH-1H are summarized in the following paragraphs for each RAM parameter which has been addressed in this evaluation. All summaries include the use of par values of GFE not yet installed on the aircraft.

3.2 System MTBF.

The system MTBF observed during DT II was 2.23 hours for Boeing and 2.32 hours for Sikorsky. During the last 200 hours of OT II Boeing demonstrated an MTBF of 3.10 hours while Sikorsky demonstrated an MTBF of 2.54 hours. The latter results are significantly better than those of DT II.

The OT II MTBF's are also significantly better than the 2.19 hour MTBF demonstrated by the UH-1H during tests at Fort Campbell in 1975. While the Boeing MTBF during the last 200 hours of OT II surpassed the DCP interim MTBF goal of 2.6 hours, Sikorsky was slightly below it.

Reliability growth analysis of all flight testing to date indicates that both UTTAS contractors should be in the vicinity of the 4.0 hour MTBF maturity goal by DT/OT III provided the current growth rate is maintained. In order to maintain the current growth rate during the maturity phase, the contractor's management must continue to allocate the resources necessary for an aggressive reliability improvement plan.

3.3 Mean Time Between Mission Aborts.

The mean time between mission abort events during DT II was 20.6 hours for Boeing and 16.0 hours for Sikorsky. During the last 200 hours of OT II it was 28.6 hours for both UTTAS contractors, a significant increase over that observed during DT II. The latter estimate is also significantly greater than the TRADOC interim goal of 9.5 hours. Achievements to date of both UTTAS candidates in the area of mean time between mission aborts are significantly below the 67.9 hours obtained for the UH-1H.

3.4 <u>Scheduled Maintenance</u>.

The scheduled maintenance man-hour per flight hour ratio during DT II was 0.94 for Boeing and 1.27 for Sikorsky. During the last 200 hours of OT II it was 0.75 for Boeing and 0.72 for Sikorsky, a significant improvement over the DT II results. These latter estimates are also significantly less than the 1.24 scheduled maintenance man-hour per flight hour ratio of the UH-1H. The MN and DCP specify a maturity goal of 1.0 scheduled maintenance man-hours per flight hour. Both UTTAS contractors met this goal during the last 200 hours of OT II.

3.5 <u>Unscheduled Maintenance</u>.

The unscheduled maintenance man-hour per flight hour ratio during DT II was 2.24 for Boeing and 1.44 for Sikorsky. During the last 200 hours of OT II the unscheduled maintenance man-hour per flight hour ratio was 1.16 for Boeing and 1.32 for Sikorsky. These estimates are all significantly greater than the 0.87 unscheduled maintenance man-hour per flight hour ratio of the UH-1H. While Boeing exhibited a significant improvement in the unscheduled maintenance man-hour per flight hour ratio during OT II, Sikorsky did not.

The fault corrective maintenance man-hour per flight hour ratio was 0.90 for Boeing and 1.10 for Sikorsky during the last 200 hours of OT II. These estimates are significantly less than the MN and DCP maturity goal of 2.8 fault corrective man-hours per flight hour. The actual clock maintenance per event (mean time to repair) for all independent and dependent failures during the last 200 hours of OT II was 1.49 hours for Boeing and 1.23 hours for Sikorsky.

3.6 <u>Total Maintenance</u>.

The total maintenance man-hour per flight hour ratio during DT II was 3.18 for Boeing and 2.71 for Sikorsky. During the last 200 hours of OT II it was 1.91 for Boeing and 2.04 for Sikorsky, a significant improvement compared with the DT II results. In comparison with the 2.10 total maintenance man-hours per flight hour ratio of the UH-1H, the 1.91 ratio of Boeing during the last 200 hours of OT II was significantly smaller. The difference between Boeing and Sikorsky in this portion of the test was not significant and the Sikorsky results were not significantly different from those of the UH-1H. Both contractors met the DCP maturity goal of 3.8 maintenance man-hours per flight hour for total maintenance.

3.7 <u>Availability</u>.

During the last 200 hours of OT II both UTTAS candidates experienced an inherent availability of 0.957, slightly lower than the 0.962 inherent availability of the UH-1H. The systems specification requires that the inherent availability be at least 0.97 at maturity. With reliability improvements both contractors should be able to meet the maturity goal.

The achieved availability during the last 200 hours of OT II was 0.955 for Boeing and 0.947 for Sikorsky, both being slightly higher than the 0.933 achieved availability of the UH-1H. Both UTTAS contractors have exceeded the system specification maturity goal of 0.92 for achieved availability.

The operational availability during the last 200 hours of OT II was 0.851 for Boeing and 0.840 for Sikorsky, both being slightly higher than the 0.819 operational availability of the UH-1H. These estimates assume an 8 percent NORS rate and an administrative delay rate between 2 and 3 percent. Both UTTAS contractors have exceeded the MN maturity goal of 0.82 for the operational availability.

3.8 Durability.

There were insufficient flight test hours during DT/OT II to adequately assess the mean-time-between-removal of UTTAS major dynamic components. Verification of the MN requirement of 1500 hours MTBR will be possible by continued tracking of limited production aircraft.

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LIST OF APPENDICES

LIST OF APPENDICES (Continued)

APPENDIX 1

RELIABILITY, AVAILABILITY, MAINTAINABILITY AND DURABILITY METHODOLOGY

RAM Methodology

A. Reliability

In general terms reliability is defined as the probability that a system will perform a required function under specified conditions, without failure, for a specified period of time. For reliability of a hardware system to be measured, the essential elements of the general reliability definition must be defined. These elements are:

1. the required function
2. specified conditions or operational environment,
3. failure, and
4. specified period of operation.

The exponential distribution (i.e., constant failure rate) is often assumed as the failure time model. In the case of complex equipment, this assumption is generally valid. Once sample data is available, goodness of fit tests are available for testing the validity of the assumption.

The exponential reliability function has been defined as

$$R(t) = e^{-\lambda t} = e^{-t/u}$$

where t = operating time, λ = failure rate and $\mu = \frac{1}{\lambda}$ = mean time between failure.

Then the parameter to be estimated from sample life test data is either λ or μ. A point estimate of the exponential parameter leads to a point estimate of the reliability function (for a given t). Also, confidence intervals can be determined for either.

For any system undergoing design and development, failure rate generally decreases as a function of system test time. This occurs because failure modes are discovered during testing and redesign of components associated with the identified modes leads to more reliable components and a corresponding decrease in failure rate.

Reliability Growth Methodology which estimates failure rate during development, as a function of test time, has been developed by AMSAA (Reference 3). The model makes no assumption of increasing, decreasing or constant failure rate. Failure rate, u(t), where u(t) is the instantaneous rate of failure occurrence after t hours of testing is estimated from the following equation.

$$u(t) = \hat{\lambda}\hat{\beta}t^{\hat{\beta}-1}$$

where $\hat{\lambda}$, the scaling parameter, and $\hat{\beta}$, the growth parameter are maximum likelihood estimates obtained from test data. When $\hat{\beta}<1$, u(t) decreases with test time. When $\hat{\beta}>1$, u(t) increases with test time. When $\hat{\beta}=1$, $u(t) = \hat{\lambda}$ and failure rate is constant. The latter case represents the homogeneous Poisson process.

The above Reliability Growth Methodology has been applied to failure rates observed at different points in time in the UTTAS program and predictions of failure rates at maturity have thereby been derived.

In the case of failure rates observed during DT II and OT II it was anticipated that there would be neither an increasing nor decreasing trend in each of the two tests. This hypothesis was tested and accepted. Consequently, the homogeneous Poisson process was applied to reliability parameters observed during DT II and OT II.

When the homogeneous Poisson process is applicable to a period of test time, T, and N failures are observed, the maximum likelihood unbiased estimate of the true failure rate λ is obtained by the following equation.

$$\hat{\lambda} = \frac{N}{T}$$

The upper bound of failure rate, λ_u, is obtained with 90 percent confidence by finding λ_u such that:

$$\sum_{X = N+1}^{\infty} \frac{[\lambda_u T]^X e^{-\lambda_u T}}{X!} = 0.90$$

These techniques were applied to DT II and OT II results to obtain failure rate estimates and confidence bounds.

When the 90 percent upper bound of failure rate, λ_u, is calculated, the corresponding 90 percent lower bound of mean time between failure, μ_1, is obtained from the following equation.

$$\mu_1 = \frac{1}{\lambda_u}$$

The 90 percent lower bound of reliability, R_1, for a specified period of operation, t, is obtained from:

$$R_1 = e^{-\lambda_u t}$$

B. <u>Maintainability</u>

Maintainability is not so succinctly defined as reliability. We tend to associate maintainability characteristics of a system with ease of maintenance, type of maintenance and frequency of maintenance required to keep the system operable. Ease of maintenance is associated with integral work platforms, quick disconnects and modular replacement. Type of maintenance is associated with particular maintenance categories, such as scheduled and unscheduled for various maintenance functions, subsystems, components, skill levels, etc. Frequency of maintenance is associated with the number of maintenance actions per operating hour, mile, round, etc. Ease, type and frequency of maintenance are all interrelated. Advances in maintenance concepts and materiel make the job easier, reduce the requirements for a particular type of maintenance and lessen the maintenance frequency. Ease of maintenance is not directly measurable. Maintenance concepts and materiel which lessen the workload can be evaluated qualitatively. Any quantitative affects are reflected only in the frequencies and associated times of different types of maintenance. It is difficult to isolate the affects of the concept from the remaining portion of the maintenance burden in the particular maintenance category. Consequently, the aspects of maintainability which are normally evaluated are those which are directly measurable, such as maintenance man hours per flight hour, operating hour, mile, round, etc. In the UTTAS program the measurable maintainability indices addressed are those such as maintenance

man hours per flight hour, active clock time per flight hour, down time per flight hour, maintenance man hours per event, number of maintenance events per flight hour, etc. All of these indices are interrelated and can be placed into two basic categories. The discussion which follows, addresses the two basic categories and presents methodology for obtaining estimates and confidence bounds on the maintenance indices within each category. This methodology was used in the analysis of the various UTTAS maintainability indices.

The two categories of measurable maintainability indices are:

1. Maintenance time per flight hour,
2. Frequency per flight hour

where maintenance time is measured as maintenance man hours direct, maintenance man hours indirect, maintenance man hours direct and indirect combined or active clock time, and frequency is measured as the number of maintenance actions over a specified period.

Maintenance time per flight hour for a particular maintenance index is estimated by

$$M = \frac{\sum_{i=1}^{N} t_i}{T}$$

where N = the number of maintenance actions observed, t_i = the maintenance time associated with the i^{th} maintenance action, and T = the number of flight hours for the particular maintenance index of interest.

Frequency of maintenance per flight hour, estimated by

$$F = \frac{N}{T}$$

where N and T are as defined above.

Assume that M_1 and M_2 are two estimates (for different contractors, time periods, categories, etc.) of a maintainability index of interest.

$$M_1 = \frac{\sum_{i=1}^{N_1} t_i}{T_1}, \text{ and}$$

$$M_2 = \frac{\sum_{i=1}^{N_2} t_i}{T_2}$$

Assume also that a good estimate of the variability of the T_i's has been obtained from other data. We then have,

$$\text{Var } (t_i) = \sigma^2$$

Now let us assume we wish to test for significant differences between M_1 and M_2. We have,

$$\text{Var } (M_1) = \frac{N_1 \sigma^2}{T_1^{\ 2}}$$

and

$$\text{Var } (M_2) = \frac{N_2 \ \sigma^2}{T_2^{\ 2}}$$

Assuming M_1 and M_2 are estimates from populations with identical maintainability indices, M, and N_1 and N_2 are sufficiently large, then M_1-M_2 will be approximately normally distributed with mean zero and variance

$$\frac{\sigma^2}{T_1^{\ 2} T_2^{\ 2}} [N_1 T_2^{\ 2} + N_2 T_1^{\ 2}]$$

and the quantity

$$\frac{[M_1 - M_2] \ T_1 T_2}{\sigma \sqrt{N_1 T_1^{\ 2} + N_2 T_2^{\ 2}}}$$

will then be approximately distributed as the unit normal distribution with mean zero and variance one. The hypothesis that $M_1 = M_2$ is then tested by using tables of the Unit Normal Distribution.

Suppose N_1 and N_2 maintenance actions for two contractors, categories, subsystems, etc., are observed during time periods T. Then the differences in frequencies F_1 and F_2 where

$$F_1 = \frac{N_1}{T}$$

and

$$F_2 = \frac{N_2}{T}$$

may be tested. If N_1 and N_2 are sufficiently large, and it is assumed that F_1 and F_2 are estimates from populations with identical frequencies, F, then F_1-F_2 will be approximately normally distributed with mean zero and variance $\frac{N_1 + N_2}{T^2}$.

Therefore, $\frac{(F_1-F_2)T}{\sqrt{N_1 + N_2}}$ will be a t statistic with $N_1 + N_2$ degrees of freedom and the hypothesis of equal frequencies may be tested using tables of the t-distribution.

Suppose estimates $\hat{M}_1, \hat{M}_2 \ldots , \hat{M}_N$ of a particular maintainability index M are observed over N contiguous time periods $T_1, T_2, \ldots , T_N$. It may be found that the $\hat{M}_i$'s are not constant over time but exhibit a trend. The trend may be moueled by

$$M_i = \alpha + \beta T_{M_i}$$

where M_i is the true value of the maintainability index M at time T_{M_i} where T_{M_i} is the mid-point of the i^{th} time interval T_i. From the observed $\hat{M}_i$'s $\hat{\alpha}$ and $\hat{\beta}$, estimates of the true α and β, may be found such that

$$\sum_{i=1}^{N} [\hat{\alpha} + \hat{\beta}T_{M_I} - \hat{M}_i]^2$$

is minimized. This method is known as the method of least squares and is used for fitting a linear trend to data points. The least squares method has been used to detect trends in maintainability indices during DT II and OT II. Caution must be exercised when attempting to extrapolate a trend beyond observed results. Data are subject to random errors and the true underlying trend in a particular maintainability index may not be linear.

C. Availability

Availability is a measure of the degree to which an item is in an operable and committable state at the start of a mission, when the mission is called for at an unknown (random) point in time. There are three availability measures mentioned in the UTTAS requirements documents. The MN (ED) refers only to operational availability. The Systems Specification includes requirements for inherent availability and achieved availability. In general, these measures may be expressed by the formula:

$$A = \frac{\text{Total Time-Down Time}}{\text{Total Time}}$$

in which A is any of the three availability measures. This definition is in accordance with the Systems Specification which defines up time as the time during which the aircraft is either flying or is in an operationally ready status but is not being used. The total time is specified as 730 hours, a nominal calendar month, and down time calculations are based upon a usage rate of 69 flight hours per month. For calculations of inherent availability, down time includes only time for which the aircraft is not mission available due to the performance of unscheduled maintenance. To calculate achieved availability time for which the aircraft is not mission available due to preventive maintenance is also included in down time. Operational availability incorporates logistic time, waiting time, and administrative time into the down time figure.

Only inherent availability and achieved availability can be directly assessed on the basis of test data. This is done by categorizing the

chargeable clock time during which the aircraft is not mission available. A down time per flight hour ratio may be determined for chargeable unscheduled maintenance and also for chargeable preventive maintenance. Thus, the formula

$$A_i = \frac{730-69 \times \frac{\text{Unscheduled Maintenance Time}}{\text{Total Flight Time}}}{730}$$

estimates the inherent availability. Similarly, achieved availability can be estimated by the equation

$$A_a = \frac{730-69 \times \frac{\text{Unscheduled Maintenance Time} + \text{Preventive Maintenance Time}}{\text{Total Flight Time}}}{730}$$

Operational availability can be estimated only by the application of an estimate for down time due to logistics, waiting, or administrative delay. This estimate should be based on operational experience with similar systems.

D. Durability

Durability is a measure of the likelihood that a system or major component will survive to its projected service life, overhaul point or rebuild point without a failure which precludes further operation of the item and replacement of the item with a like item. Durability requirements can not be verified at high levels of confidence when the requirement is several times the period of observation. With the small number of durability failures expected during the UTTAS test the applicability of any distribution times to failure other than the exponential is difficult to establish. For this reason the assumption of a constant failure rate will be made. This permits point estimation of the mean time between removals for a particular component by the equation

$$\text{MTBR} = \frac{T \times K}{N}$$

where T is the test flight hours, K is the number of the particular item on each aircraft, and N is the number of failures observed in the test. If there are no failures, no point estimate is to be made. A 90 percent lower bound for the MTBR of each component is computed using the relation

$$MTBR_{.90} = \frac{2TK}{X^2_{.90,\ 2(N+1)}}$$

where $X^2_{.90,\ 2(N+2)}$ is the 90th percentile of the Chi-squared distribution with 2(N+1) degrees of freedom.

APPENDIX 2

UTTAS FAILURE DEFINITION AND SCORING CRITERIA

MEMORANDUM OF AGREEMENT

BETWEEN

US ARMY DEVELOPMENT AND READINESS COMMAND

AND

US ARMY TRAINING AND DOCTRINE COMMAND

1. Purpose. This agreement sets forth the Failure Definition and Scoring Criteria (FD/SC) for reliability, availability and maintainability parameters for the UTTAS.

2. Agreements.

a. The jointly agreed-to FD/SC is stated in Attachment A.

b. This FD/SC applies to the RAM parameters of the approved UTTAS Materiel Need as either a best operational capability value, a specified value or a minimum acceptable value.

c. The data to be used in measuring the parameters shall be gathered using the "RAMLOG" data system (described in paragraph 3 of Attachment A).

d. The decision on chargeability of events shall be made by the UTTAS Screening and Scoring Committees in accordance with their approved charter.

e. The UTTAS Scoring Committee is hereby granted the authority to expand or clarify the approved FD/SC in situations which are not clearly addressed.

f. Specific procedures for assessment of equipment not installed in the test aircraft (i.e., Attachment A, para 5), as part of the UTTAS system, will be jointly established by DARCOM and TRADOC in coordination with the development and operational tester.

g. UTTAS Scoring Committee will score the interim Government furnished equipment (i.e., Attachment A, para 4) as a separate action. The UTTAS FD/SC will apply to this scoring except that provisions applicable to the interim GFE will not apply.

JERRY B. LAUER Major General, USA Project Manager, Utility Tactical Transport Aircraft System (UTTAS)	W. H. VINSON, JR. Major General, GS Deputy Chief of Staff for Combat Developments

UTTAS

FAILURE DEFINITION

AND

SCORING CRITERIA

June 1976

INTRODUCTION

This is the Failure Definition and Scoring Criteria for UTTAS to be used during testing in accordance with AR 702-3. These provisions are a joint agreement between DARCOM and TRADOC and are to be used for scoring failures and classifying maintenance times in the assessment of Materiel Need (MN) RAM requirements during both developmental and operational testing.

1. RAM requirements to be evaluated. RAM data will be collected over the full range of DT and OT testing in order to establish the broadest possible data base for the assessment of RAM characteristics. In both OT II and OT III the primary conditions under which RAM data is collected will be operational missions flown in accordance with profiles established by TRADOC.

2. Definitions:

a. Mission Reliability. Mission reliability is defined as the probability of completing a 1 hour mission to include a preflight inspection and landing at a predetermined area without recognition or occurrence of an equipment malfunction that is cause for a mission abort. Missions are to be presumed to start when the aircraft flight crew starts their preflight inspection and end upon engine shutdown after completion of the last mission leg. Equipment malfunction(s)/failure(s) chargeable in determining mission reliability shall be:

(1) Aircraft malfunction(s)/failure(s) that must be corrected before takeoff which are discovered by the flight crew during preflight inspections to initiate the mission, and the cumulative corrective maintenance to ready the aircraft for flight is greater than 30 minutes after discovery of the malfunction(s)/failure(s).

(2) Aircraft equipment malfunction(s)/failure(s) occurring within the period from takeoff and equipment shutdown upon completion of the last mission leg which causes discontinuance of the mission or landing at other than intended locations.

b. Aircraft Mean Time Between Failure (MTBF). The aircraft MTBF shall be defined in accordance with MIL-STD-721 considering independent failures only. Time for this requirement is defined as flight hours measured from time of aircraft liftoff until touchdown. An item shall be considered to have failed any time corrective maintenance manhours must be expended on the item regardless of when the failure occurs or is discovered, prior to liftoff, during flight or after touchdown.

c. Fault Corrective Maintenance Manhour to Flight Hour Ratio. Fault corrective maintenance at aviation unit and intermediate support levels, exclusive of avionics and weapons subsystem, shall be a maintenance manhours per flight hour ratio. Fault corrective maintenance manhours are defined per MIL-STD-721. (See Figure 1.)

d. Inspection and Servicing Maintenance Manhour to Flight Hour Ratio. A maintenance manhour to flight hour ratio will be required for inspections (daily, preflight, periodic and special) and servicing. Inspection and servicing maintenance manhours per flight hour will be calculated using the specified inspection and servicing tasks with the following exclusions:

(1) Any action required due to operation of the aircraft beyond specified limits.

(2) Any tasks required for the purpose of retrofitting new design equipment.

(3) Any task performed on ground support equipment.

(4) Any task performed on GFE interim equipment.

(5) Any task performed for the purpose of using a different test site.

(6) Any task which is an interim measure which is not to be required for the first limited production aircraft.

(7) Any task performed only as a simulation for the purpose of statistically evaluating the manhours or elapsed time distribution for that task.

e. Operational Availability. The probability that a requested aircraft is not down for maintenance or lack of spare parts. This is a criterion applicable only to operational experience or to operational testing which allows for delay time for lack of spare parts and other functions of the Army's Logistic Support. Availability deals with only one aircraft and the likelihood of its being in an operable and committable state when it is being used and maintained under field conditions. Operational Availability will be calculated using the approved supply and administrative downtime and the maintenance downtime experienced in the period except that downtime which results from.

(1) Operation or maintenance performed by other than the authorized test personnel.

(2) Downtime for the purpose of retrofitting new equipment.

(3) Downtime generated by GFE interim equipment.

(4) Any downtime generated only as a simulation for the purpose of statistically evaluating the downtime distribution for the maintenance task.

(5) Any downtime generated for the purpose of using a different test site.

(6) Any downtime generated by an interim maintenance task which the first limited production aircraft would not require.

3. Data Collection System. A data collection was developed which will permit the acquisitions of all necessary RAM data needed for the evaluation of UTTAS RAM requirements. This system is currently being coordinated with the appropriate Government agencies and with the contractors. The data collection system consists of seven data forms, each of which will be initiated by specific operational events. The forms consist of the following:

a. Flight Debrief and Servicing

b. Maintenance Fault/Action

c. Component Parts Usage

d. Utilization/Diagnostics/Recorder

e. Narrative

f. Event Evaluation

g. Failure Analysis Disposition

The first form will be initiated with each flight debrief or servicing action. It will carry all pertinent information relating to the flight and servicing action. The second form will be initiated with the discovery of each fault and the performance of each maintenance action, both scheduled and unscheduled. It will carry pertinent information relating to failed parts, type of failure, maintenance manhours, elapsed maintenance time, airframe hours and component hours. The third form will be initiated whenever removal of parts from the aircraft is required. The removed and replacement parts will be identified and the hours since new, last installed and last overhaul (if applicable) will be reported on this form. The fourth form is employed for the recording of diagnostic type information as extracted from the aircraft diagnostic displays. The fifth form is used for a detailed narrative description of the maintenance or flight event. The sixth form is used by the UTTAS Screening and Scoring Committees to record event chargeability and a complete justification of the committees' decision. The seventh form identifies the necessary failure analysis and gives proper identification for disposition of the failure exhibit.

4. Failure Definition/Scoring Criteria.

a. Failure Definition Logic Diagrams for use in direct evaluation of measures defined in paragraphs 2a, b, c, and d above. Given that malfunction has occurred, the figure 2 series of questions must be considered in sequence to determine whether the malfunction or the fault corrective maintenance manhours is or is not chargeable. The series of questions in figure 3 is applicable to the classification of the failure as mission affecting or maintenance affecting. Classification according to mission affecting implies maintenance affecting except for diagnostic cues. The series of questions in figure 4 is applicable to the consideration

of diagnostic cue, loose hardware, minor adjustment or unscheduled SOAP sample events. The series of questions in figure 6 is applicable to flight safety classification. Classification according to flight safety definition implies mission affecting and maintenance affecting. The series of questions in figure 5 is applicable to maintenance manhour classification. The series of questions in figure 7 is applicable to missing hardware events or stop drilling of cracks.

b. Scoring criteria jointly established by DARCOM and TRADOC will be used in assessment of those test results applicable to MN requirements.

(1) For DT II and OT II evaluation. Scoring Criteria are to be established from the operational missions established by TRADOC and actually performed during at least 200 hours of OT II testing. The scoring criteria factor is to be the ratio of flight hours actually used to perform the missions identified below to the flight hours equipment may be powered during the flight hours required for the DCP goal evaluation. The following equipment and its mission usage will have the factors developed (all other installed mission required equipment has a scoring criteria factor of 1.0).

ITEM	MISSION USAGE
VHF-FM AN/ARC-114	Missions when 2 VHF-FM radios are required
External Cargo Hood	Sling-Load missions only
Troop Seats	Troop carrying missions only

The installed equipment which is required for each mission will be identified from an analysis of the detailed mission scenarios.

(2) DT III or OT III. Scoring Criteria are to be established from the operational missions established by TRADOC and actually performed during that portion of OT III identified for the DCP cover sheet no. 1 requirement evaluations. The following equipment and its mission usage will have the factors developed (all other installed mission required equipment has a scoring criteria factor of 1.0).

Absolute Altimeter AN/APN-209	Nap-of-the-earth flight only
VOR/LOC, GS, MB-AN/ARN-123	Conus missions only
Voice Security TSEC-KY-28	Wartime missions only
Secure IFF-KIT-IA/TSEC	Wartime missions only
VHF-FM AN/ARC-114	Missions when 2 VHF-FM radios are required
External Cargo Hook	Sling-Load missions only
Rescue Winch & Hook	Hoist type rescue missions only
Troop Seats	Troop carrying missions only

The installed equipment which is required for each mission will be identified from an analysis of the detailed mission scenarios to be provided by TRADOC.

c. Equipment whose failure/malfunctioning or any type of manhours for maintenance is not to be charged for the reason given below.

(1) During DT II or OT II:

ITEM	REASON
UHF-AM (radio) AN/ARC-116	Interim equipment
VOR LOC AN/ARN-82A	Interim equipment
T.L.S. AN/ARQ-31	Requirement deleted
GS/MB AN/ARN-58	Interim equipment
ABS, ALT AN/APN-171	Interim equipment
IFF AN/APX-72 with TS-1843 set	Interim equipment
YT700 Engine	Interim equipment

(2) During DT III or OT III - None.

5. Required equipment not installed in test aircraft. This equipment will have values established for the appropriate measures for use in preparing a composite system number.

a. During DT II or OT II:

(1) AN/APX-100

(1) VHF-FM radio AN/ARC-114

(1) UHF-AM radio AN/ARC-164

(1) Lightweight Doppler Navigation System (LDNS)

(1) VOR/LOC, GS, MB AN/ARN-123

(1) ABS, Altimeter AN/APM-209

(2) T700 Engines

NOTE: Values established prior to completion of OT II will have the effects of Scoring Criteria factor, as indicated in paragraph 4b(2) integrated into the composite number.

b. During DT III or OT III. At this time, there is no equipment required for missions which will not be installed in the Low Rate Initial Production (LRIP) aircraft.

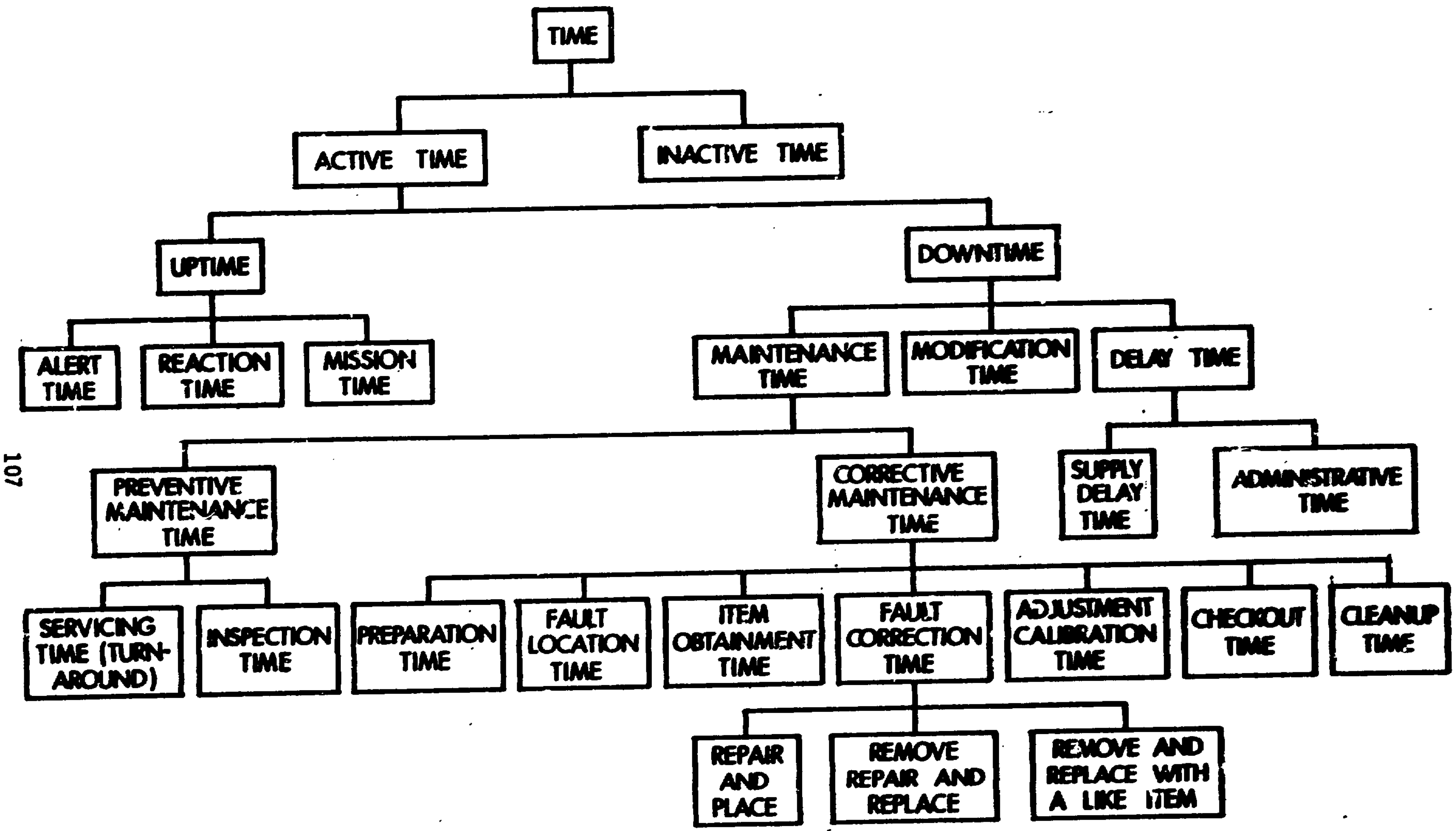
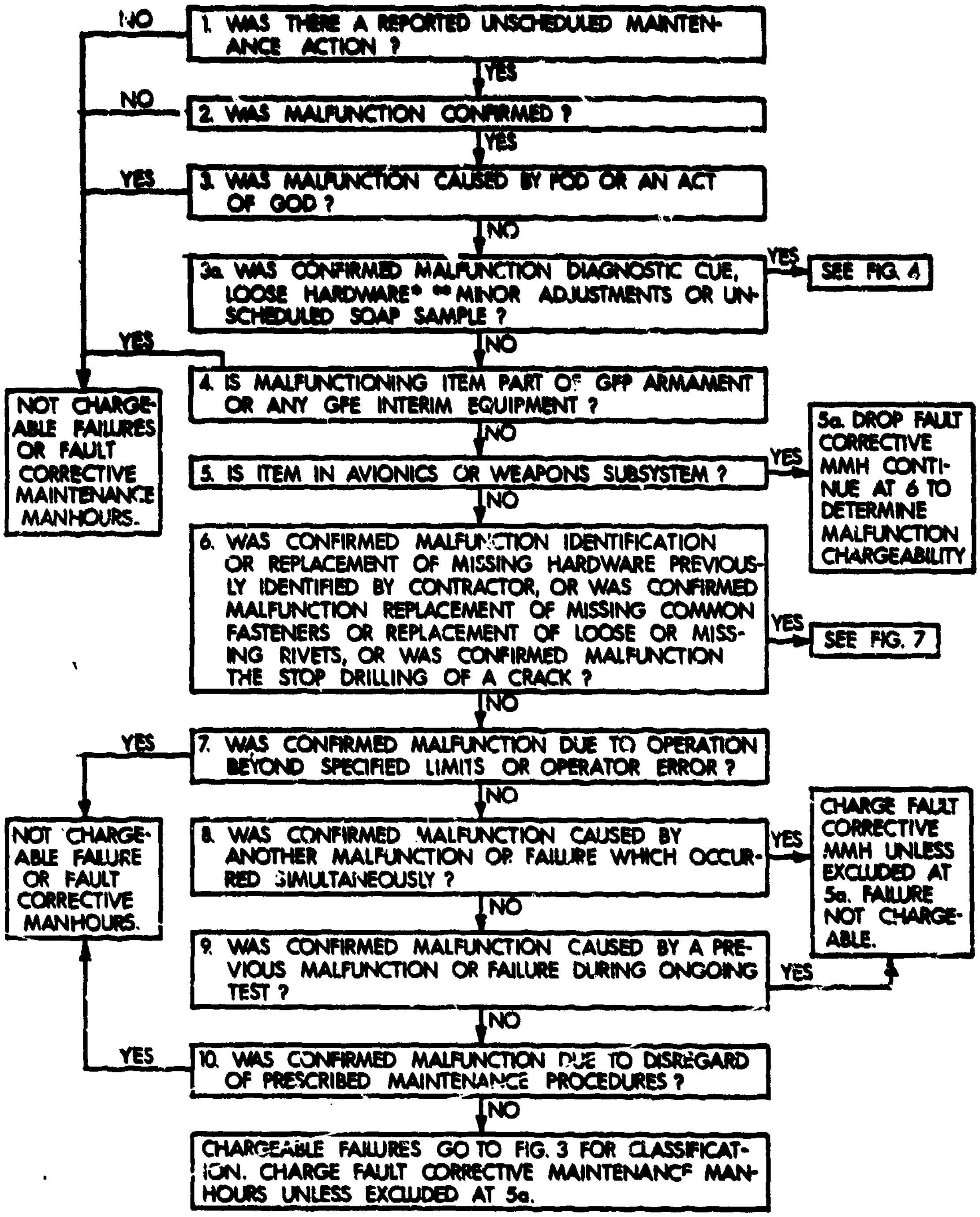


Figure 1. Time Relationship.



* DOES NOT APPLY TO LOOSE RIVETS.
** DOES NOT APPLY TO STOP DRILLING OF A CRACK.

Figure 2.

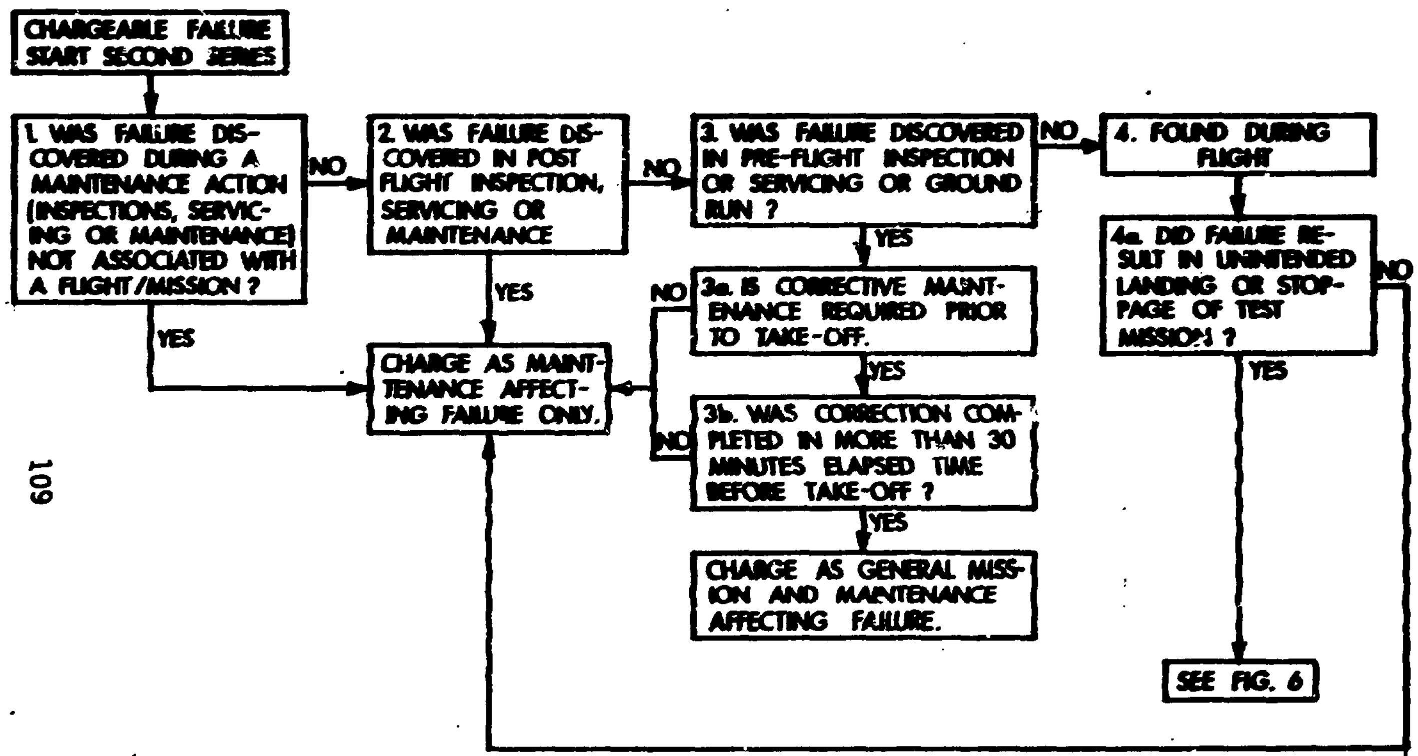
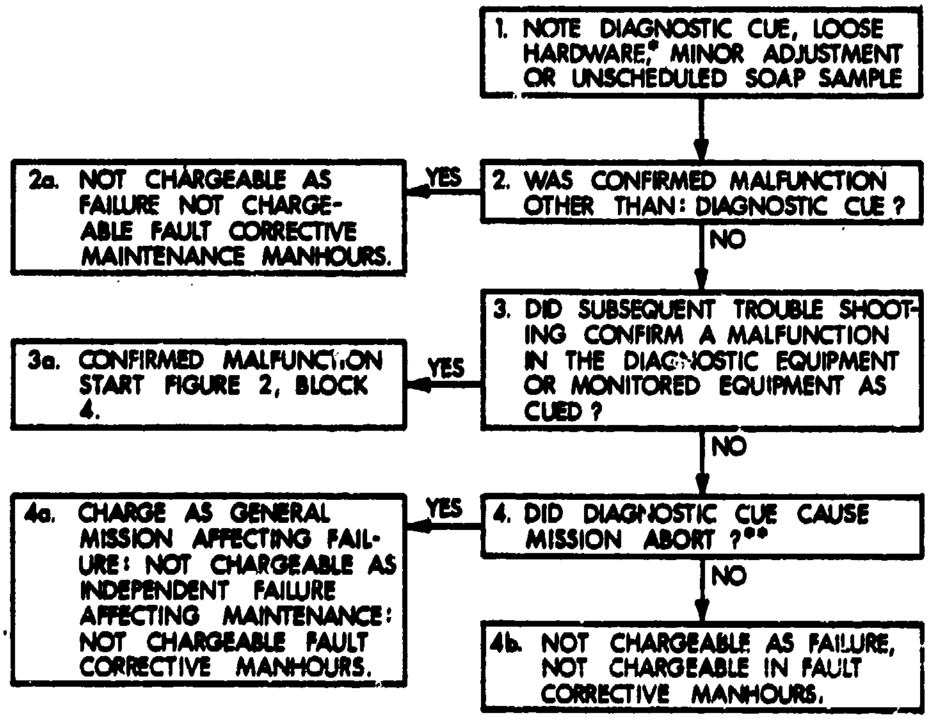


Figure 3. Mission Decision Flow Chart.



* DOES NOT INCLUDE LOOSE RIVETS.

** TO ANSWER THE QUESTION ON MISSION ABORT, THE ANALYST MUST GO THROUGH QUESTIONS 4 THROUGH 11 ON FIGURE 2 AND QUESTION 1 THROUGH 4 ON FIGURE 3 IGNORING ONLY THE CHARGEABLE FAILURE AND CHARGEABLE FAULT CORRECTIVE MANHOURS UNNUMBERED BLOCK INSTRUCTIONS.

Figure 4. Diagnostic Cue Flow Chart.

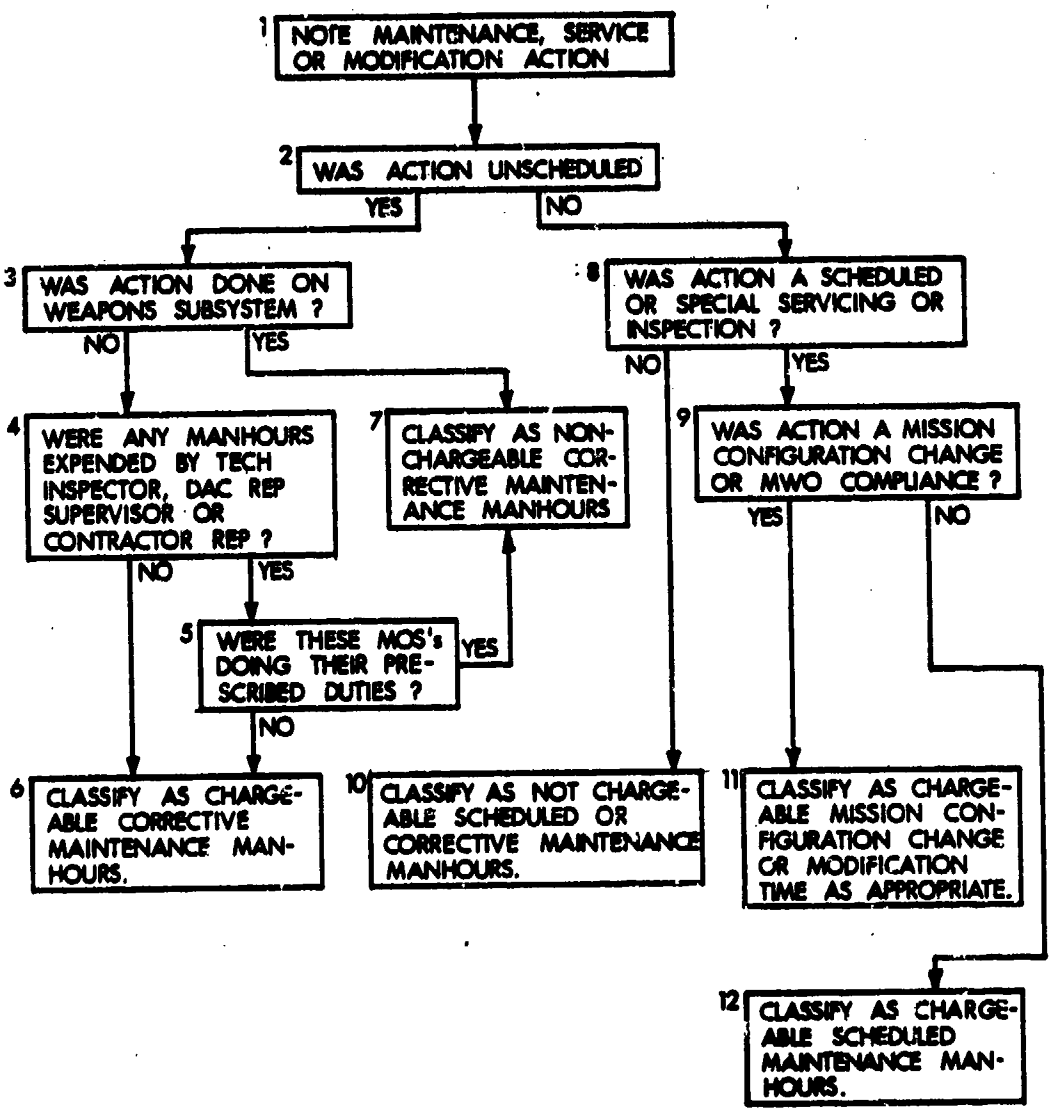
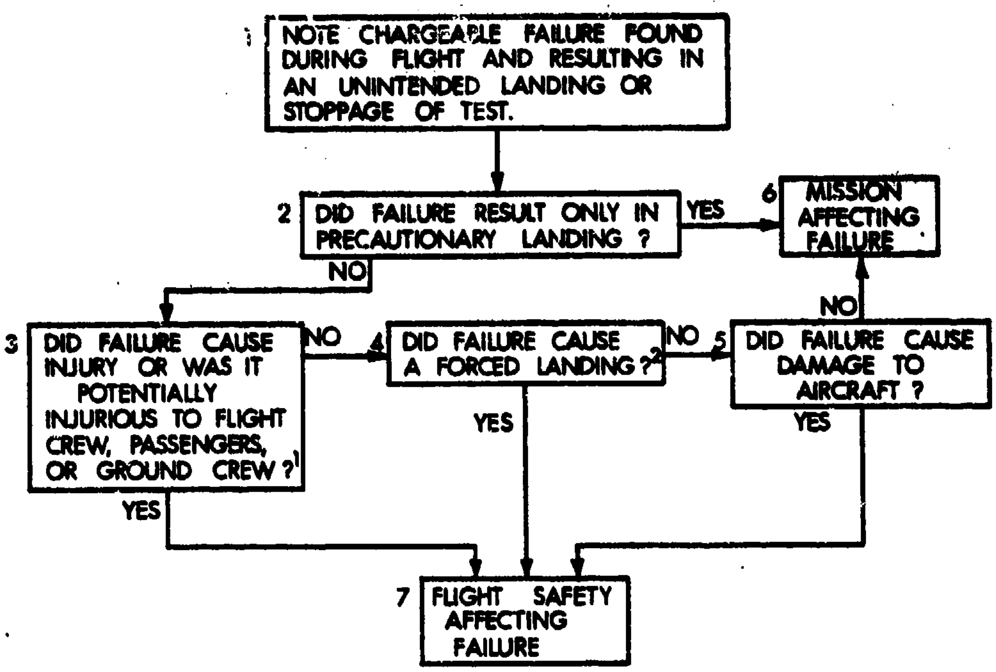


Figure 5. DARCOM/TRADOC Maintenance Classification.



1. MUST BE IN PROXIMITY OR CREW/TROOP STATIONS OR POSSIBLE LOCATION OF PEOPLE/PERSON UNDER NORMAL CIRCUMSTANCES.
2. PILOT/COPILOT HAD NO CHOICE BUT TO BRING AIRCRAFT TO GROUND.

Figure 6. Flight Safety Flow Chart.

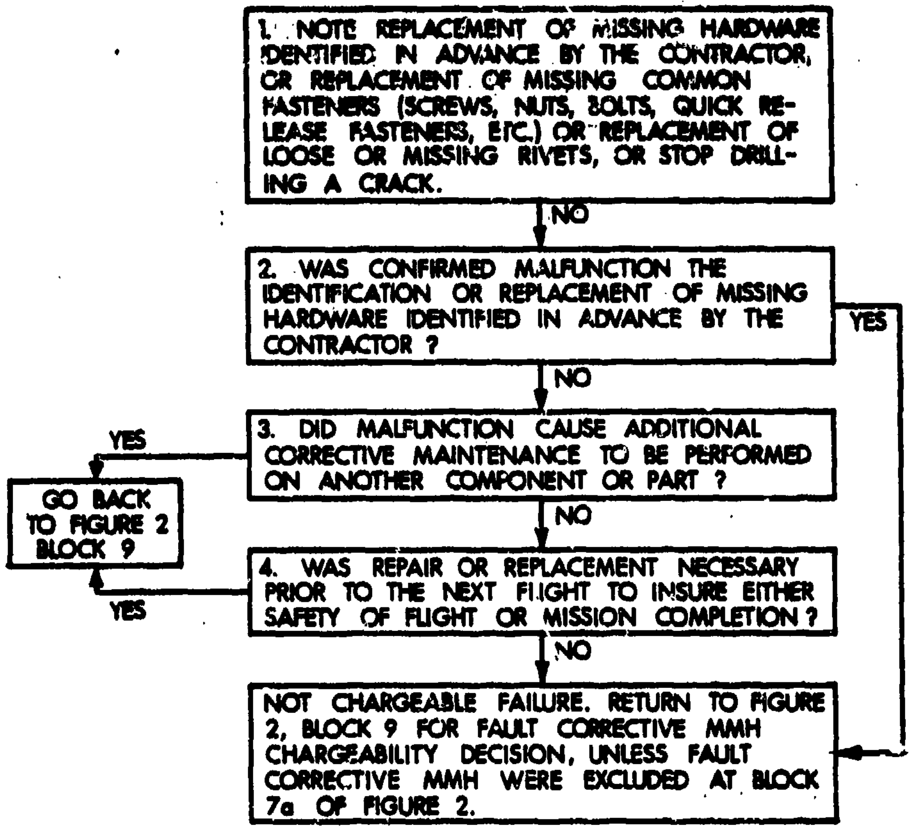


Figure 7.

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APPENDIX 3

YT700 RELIABILITY AND MAINTAINABILITY DEFINITIONS

YT 700 RELIABILITY AND MAINTAINABILITY DEFINITIONS

1. Mean-Time-Between-Failure (MTBF). The toal engine operating time of a population of engines divided by the total number of relevant events of engine failure experienced within the population during the measurement interval.

2. Failure. Inability to perform required function within specified limits.

3. Failure Requiring Overhaul (FRO). Failures in which corrective maintenance is sufficiently extensive to be beyond the capability of the organizational or direct support level; i.e., best performed at depot level.

4. Failure Classes:

Class I - Failures that result in destruction of an engine or loss of aircraft control or fire external to the engine.

Class II - Failures which result in In-Flgiht shutdown.

Class III - Failures which result in potential power losses completely or partially rectified by automatic or manual corrective action.

Class IV - Failures which result in power loss or no start.

Class V - Any failure which requires unscheduled maintenance action.

5. Power Loss. Inability to obtain and/or sustain at least ninety percent of the desired power level.

6. Primary Failure. An independent failure not as a result of some other failure.

7. Secondary Failure. Any failure wi the engine which was the result of some other failure.

8. Excluded Failures:

a. Failures resulting from errors of maintenance personnel.

b. Failures resulting from operating the engine beyond specification limits. Included failures are those operationally related failures for which the engine provides integral protective devices.

c. Failures resulting from airframe components.

d. Failures to start if a successful start is accomplished without corrective maintenance action.

e. Reported operating malfunctions which cannot be verified by subsequent investigation, flight or ground test.

f. Multiple part removals and other maintenance actions performed upon the same engine following an initial failure requiring maintenance action will be counted as one failure against the engine.

g. Failures of equipment not furnished by the engine contractor.

h. Failures for which a corrective engine design change or an operational procedure change has been demonstrated, and approved by the Government, will be removed from the failure count unless the events are identical to those for which corrective action was taken and it has been determined that the prescribed corrective action procedures have been utilized.

9. Fault Corrective Maintenance. The actions performed as a result of a failure, to restore an item to a specified condition.

10. Mean-Time-Between-Maintenance (MTBM). The mean of the distribution of the time intervals between all maintenance actions, excluding daily inspections.

11. Mean-Down-Time (MDT). The mean of the distribution of elapsed active maintenance times for all maintenance actions performed at the organizational and field levels, excluding engine removal or installation into the aircraft, daily inspections and any maintenance action that can be completed in five minutes.

12. Excluded Maintenance Tasks:

a. Maintenance or operational errors not chargeable to engine technical orders or training provided by the engine contractor.

b. Repair of battle damage or accident damage other than engine caused accident damage to the engine.

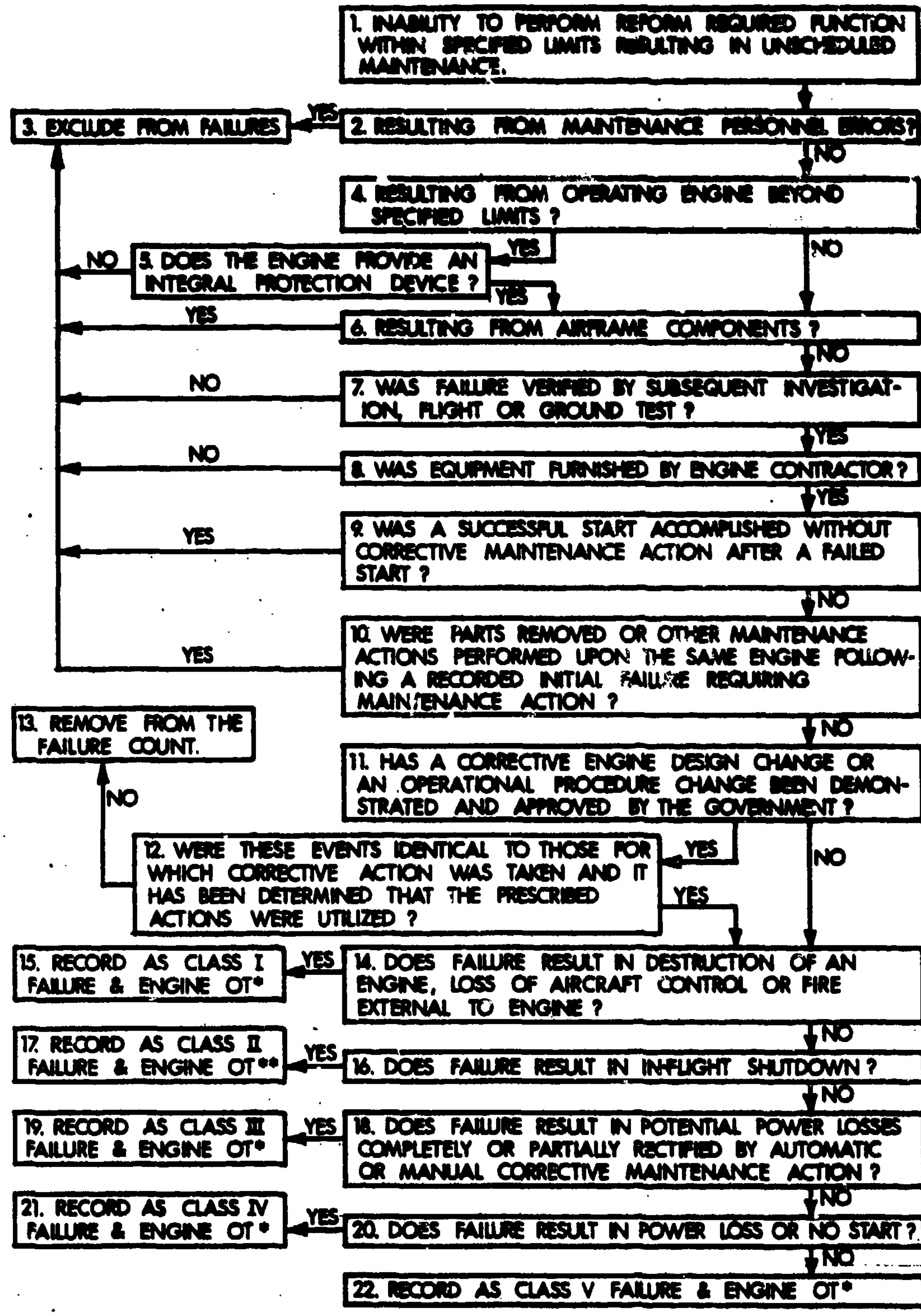
c. All maintenance on special test instrumentation.

d. Assembly and disassembly of quick change engine kits.

e. Positioning maintenance stands and gaining access to the engine.

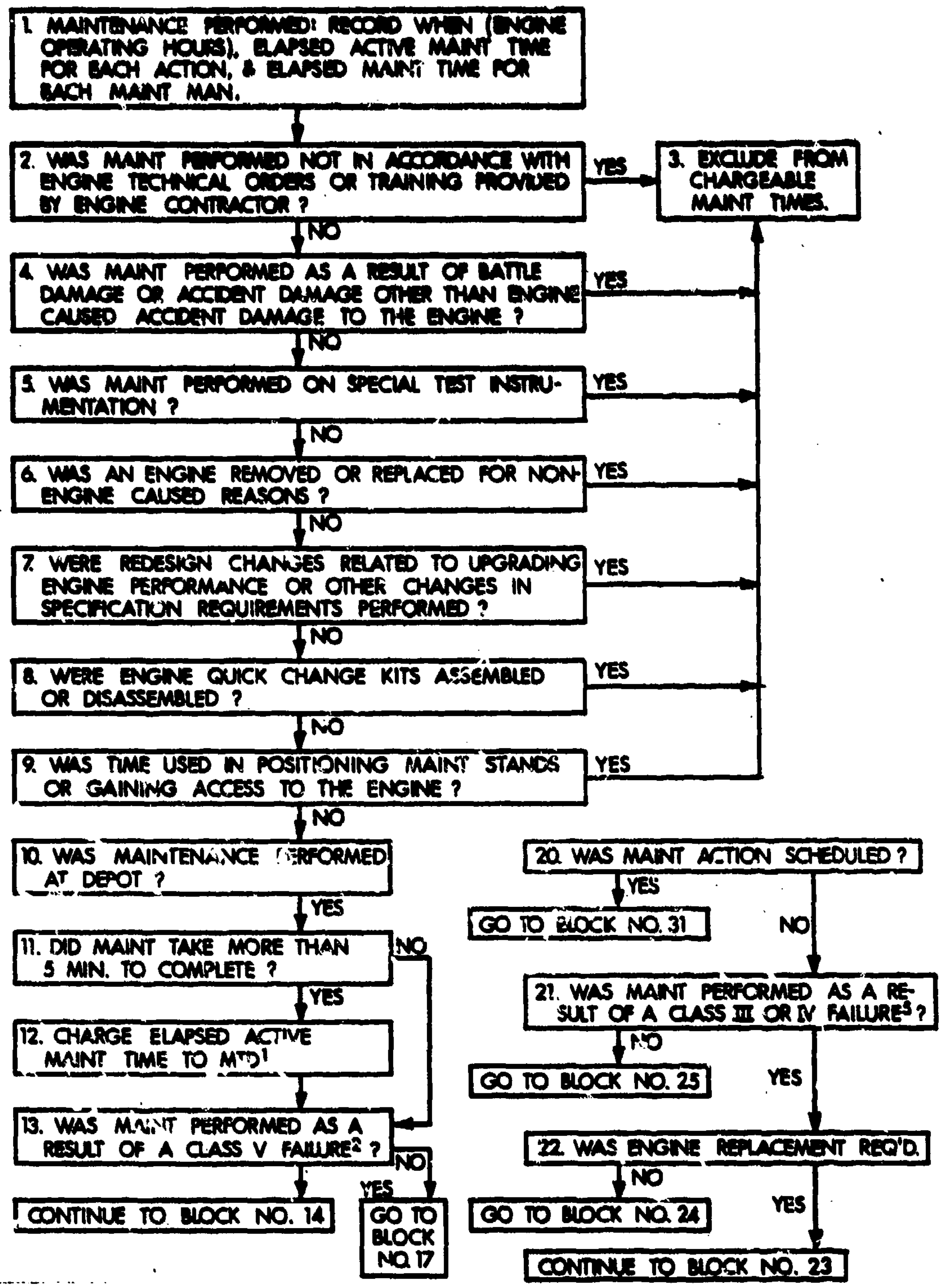
f. Engine removal and replacement for non-engine caused reasons.

g. Redesign change when related to upgraded engine performance or other changes in specification requirements.



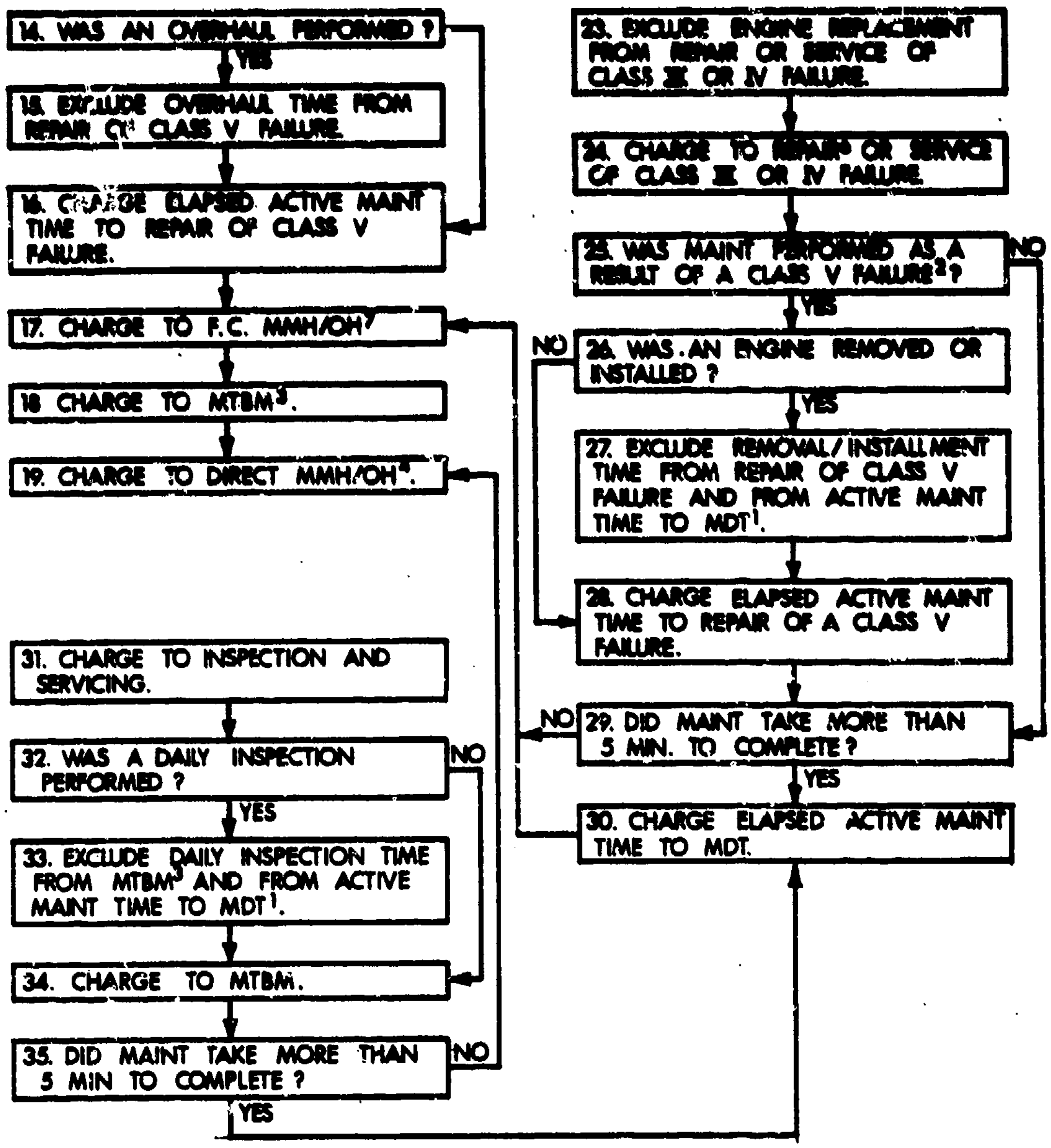
*OT: OPERATING TIME

YT 700 Engine Reliability Failure Definition and Scoring Criteria.



* SEE FOOTNOTES

YT 700 Engine Maintainability Definition and Scoring Criteria.



* SEE FOOTNOTES

FOOTNOTES

1. MDT: Mean-Down-Time.

2. CLASS V FAILURE: Failure which requires unscheduled maint. action.

3. MTBM: Mean-Time-Between-Maintenance.

4. MMH/OH: Maint Man-Hour/Engine Operating Hour

5. CLASS III FAILURE: Failures which result in potential power losses completely or partially rectified by automatic or manual corrective action.

   CLASS IV FAILURE: Failures which result in power loss or no start.

6. REPAIR: Fault location and correction time, adjustment/calibration time checkout time, and cleanup time.

7. F.C. MMH/OH: Fault corrective main man-hours/engine operating hours.

APPENDIX 4

UTTAS MINIMUM ACCEPTABLE VALUES

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MEMORANDUM OF AGREEMENT

BETWEEN

US ARMY MATERIEL DEVELOPMENT AND READINESS COMMAND

AND

US ARMY TRAINING AND DOCTRINE COMMAND

PREPARED BY: UTTAS PROJECT MANAGER'S OFFICE

RETYPED BY: AMSAA

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MEMORANDUM OF AGREEMENT

BETWEEN

US ARMY MATERIEL DEVELOPMENT AND READINESS COMMAND

AND

US ARMY TRAINING AND DOCTRINE COMMAND

1. Purpose. This agreement sets forth the reliability, availability, and maintainability (RAM) minimum acceptable values (MAV) for the UTTAS.

2. Agreements.

a. The jointly agreed to UTTAS MAV are stated in Table 1 at Incl 1.

b. The system configuration, definitions, rationale, and qualitative risk assessment in support of these MAV are described at Incl 2.

c. With the establishment of these MAV, the current RAM values in the approved UTTAS Materiel Need will be considered as best operational capability values. As such, the MN RAM values will continue to be the RAM requirements for the mature aircraft.

d. Flight safety reliability will be considered at the conclusion of each test cycle but will be demonstrated during the first 165,000 flight hours of operational use.

e. MAV, other than mentioned in d above, will be assessed as follows in DT/OT II.

(1) The interim test goals for system MTBF (1.82) and mission reliability (.90) as found in the CTP will be demonstrated with a .70 lower confidence level.

(2) All other MAV will be demonstrated as nominal point estimates.

f. MAV, except for the flight safety, for DT/OT III will be demonstrated as follows:

(1) System MTBF and mission reliability will be demonstrated at a confidence level to be negotiated by DARCOM and TRADOC after evaluation of OT II results and determination of potential reliability growth during

maturity test phase.

(2) Other MAV are to be demonstrated at approximately 90% confidence level during DT/OT III.

g. Operational availability point estimate achievement and demonstration will be calculated with an assumed Not Operational Ready due to Supply (NORS) rate of 8%.

GEORGE SAMMET, JR.
Lieutenant General, USA
Deputy Commanding General
for Materiel Development
United States Army Materiel
Development and Readiness Command

W. H. VINSON, JR.
Major General, GS
Deputy Chief of Staff
for Combat Developments
United States Army Training
and Doctrine Command

The UTTAS minimum acceptable values (MAV) in accordance with AR 702-3 and the 16 May 74 Memorandum of Agreement between AMC and TRADOC are as follows: (The approved MN value is listed for reference only.)

RAM Parameter	MN Value	MAV
Dynamic Component MTBR	1500 flt hrs	Not required
Flight Safety Reliability	.999952	.9997
Mission Reliability	.986909	.982
Fault Corrective Manhours per Flight Hour	2.8	8.0*
Probability of Restoration in 30 min with 2 men	.9	Not required
Operational Availability (OA)	.82	.75
Mean Time Between Failure	4.0 flt hrs	2.7*
Inspection and Servicing Manhours per Flight Hour	1.0	2.17*

*These values are based on the proposed TOE for the assault helicopter company (AHC) and apply solely to the UTTAS.

UTTAS RAM MAV

INDEX

UTTAS OPERATIONAL RATIONALE

MINIMUM ACCEPTABLE VALUES

1. Dynamic Component MTBR. The user has no need to identify a MAV for dynamic component removal. The user's need can be quantified by identifying MAV for manhours per flight hour, mission reliability, and operational availability.

2. Probability of Restoration in 30 Minutes with Two Men. The user has no need to identify a MAV for restoration time since mission reliability is the salient element from an operational viewpoint. In this regard, mission reliability criteria must be met and will dictate that the restoration time must be within the boundary of 30 minutes by two men.

3. Mission Reliability. The primary mission of the assault helicopter company is to lift the assault elements of one rifle company. In addition, one additional aircraft must be available for either mission aborts or to perform the logistical maintenance function required by the assault helicopter company. Based on a one hour mission, a MAV of .982 permits accomplishment of this mission. These planning figures are dependent on the TBOI approved by the Department of the Army in 1972.

4. Flight Safety Reliability. Comparison flight safety reliability with other US Army helicopters indicates that the lowest reliability rate that will be an acceptable MAV at OT II will be consistent with the current helicopter fleet. Since achievement of reliability is a function of time and availability of numbers aircraft, it can be projected that reliability will achieve a substantial improvement over the current fleet during DT/OT III.

5. Fault Corrective Maintenance Manhours per Flight Hours. This MAV will provide a lower level of maintenance than required for the UH-1H at OT II. Fault corrective maintenance relates directly to mission reliability. The UTTAS mission reliability MAV must be met to insure that the assault helicopter can accomplish the primary mission. This MAV is subject to limitation of inspection and servicing manhours per flight hour. However, this MAV is dependent on meeting and inspection

and servicing time of 1.61 hours per flight hour at OT II.

6. Inspection and Servicing Manhours per Flight Hours. The projected TOE for the UTTAS Assault Helicopter reduces the number of maintenance personnel required to maintain the UTTAS. Since inspection and servicing and other AVUM functions cannot exceed the number of hours available to perform the required AVUM functions, this MAV is considered to be the highest level that is acceptable at OT II.

7. Operational Availability. This MAV for availability is that the assault elements of one rifle company must be lifted by 75% of the aircraft in a UTTAS company.

8. Mean Time Between Failure (MTBF). Achieving the MAV by OT II will permit the availability of aircraft provided the maintainability best operational capability can be demonstrated at GCT and there is no more than a 35% degradation due to operational causes.

UTTAS RELIABILITY AND MAINTAINABILITY
MINIMUM ACCEPTABLE VALUES
RISK ASSESSMENT

1. The following table provides a risk assessment of achieving the MAV's as point estimates at the appropriate time point as identified in the Memorandum of Agreement.

2. Two parameters were recommended not to have MAV established. One, the Dynamic Component Mean Time Between Removal, will be tracked during the program to assure reasonable component depot repair costs. The other, the probability of restoration in 30 minutes with 2 men, will be evaluated only as part of assessing the contractors compliance with their respective Prime Item Development Specification (PIDS) for that parameter.

3. The MAV that carries a high risk is the Flight Safety Reliability. The Flight Safety Reliability assessed risk is due solely to the limited number of flight hours in the development test program. It is planned for the winning contractor to accumulate 4080 flight hours at the end of OT III. Including the other contractor's Basic Engineering Development phase flight hours increases this to 5375 flight hours. To allow for a medium risk to be assessed, it is considered that 14,000 flight hours would have to form the data base experience.

4. The MAV's assessed as low risks are the inspection and servicing maintenance manhours per flight hour, the operational availability and the system MTBF.

TABLE 1

RAM PARAMETER	TRADOC PROPOSED MAV	MATERIEL DEVELOPER RISK ASSESSMENT
Dynamic Component MTBR	Not to be established	None
Probability of restoration in 30 minutes with 2 men	Not to be established	None
Mission Reliability	.982	MEDIUM. The reliability growth during the Maturity Phase is expected to achieve a level at the MAV as a point estimate.
Flight Safety Reliability	.9997	HIGH. Any reasonable level of flt safety reliability carries a high risk of achievement demonstration because of the limited flight test program. This MAV requires that 2 failures not be experienced for the point estimate to be equal to or greater than the MAV.
Fault Corrective Maintenance Manhours per Flight Hour	8.0 (5.0 for AVUM, 3.0 for IS maint levels)	MEDIUM TO LOW. Expect a level not greater than 7.5 at beginning of GCT.
Inspection and Servicing Manhours per Flight Hour	2.17	LOW. Boeing Vertol and GE data indicate that 2.14 could be the average rate during contractor flt test program. No data from Sikorsky is available.
Operational Availability	.75	LOW. Based on calculating operational availability with an assumed "Not operational ready due to supply" (NORS) rate of 8%.
Mean Time Between Failure	2.7	LOW. The reliability growth during the Maturity Phase is expected to achieve a level of 3.2 flt hours MTBF.

APPENDIX 5

GOVERNMENT FURNISHED EQUIPMENT OF THE UTTAS PRODUCTION CONFIGURATION

Government Furnished Equipment (GFE) of UTTAS Production Configuration

The table below gives a description of the Government Furnished Equipment (GFE) which was not installed on the UTTAS at the time of DT/OT II. This equipment will be installed on the UTTAS at the time of full scale production.

TABLE 1

Item Description	Quantity On Aircraft
Transponder Set, AN/APX-100	1
VHF-FM Radio Set, AN/ARC-114	1
UHF-AM Radio Set, AN/ARC-164	1
Lightweight Doppler Navigation System AN/ASN-128	1
VOR LOC, GS/MB AN/ARN-123	1
Absolute Altimeter AN/APN-209	1
Communication Security Set, TSEC/KY-28	3
Computer, Mark XII Kit-1A/TSEC	1
Voice Gating Circuit, MD954	4
ADF Compensation CN 1404	1
T700 Engine	2

Par Values of Government Furnished Equipment (GFE)

The RAM requirements which have been established for the UTTAS development program apply to all contractor and Government Furnished Equipment (GFE) of the UTTAS production configuration. The table below gives estimates of the impact of the GFE which was not installed during DT/OT II on the RAM parameters which have been assessed in this evaluation. These estimates are referred to as par values for GFE.

TABLE 2. PAR VALUES FOR GFE

PARAMETER	GFE PAR VALUE
System failure rate	.028 failures per flight hour
Mission failure rate	.010 mission aborts per flight hour
Corrective maintenance manhours per flight hour (AVUM and AVIM)	.22 manhours per flight hour
Scheduled maintenance manhours per flight hour	.15 manhours per flight hour
Fault corrective maintenance manhours per flight hour	.18 manhours per flight hour
Downtime (applicable to achieved availability)	.06 clock hours per flight hour

These values have been included in the assessment of UTTAS RAM parameters in this evaluation unless otherwise specified. Tables in this appendix provide further information on the derivation of these par values.

TABLE 3. ESTIMATED SYSTEM FAILURE RATES OF THE GOVERNMENT FURNISHED EQUIPMENT (GFE) OF UTTAS PRODUCTION CONFIGURATION

ITEM DESCRIPTION	QUANTITY ON AIRCRAFT	FAILURE RATE (FAILURES PER 1000 HOURS)
Transponder Set, AN/APX-100	1	1.6
VHF-FM Radio Set, AN/ARC-114	1	2.6
UHF-AM Radio Set, AN/ARC-164	1	1.0
Lightweight Doppler Navigation System, AN/ASN-128	1	4.7
VOR LOC, GS/MB AN/ARN-123	1	1.6
Absolute Altimeter AN/APN-209	1	1.6
Communication Security Set, TSEC/KY-28	3	3.0
Computer, MARK XII, KIT-1A/TSEC	1	0.4
Voice Gating Circuit, MD 954	4	1.1
ADF Compensation, CN 1404	1	0.2
General Electric T700 Engine	2	10.0
Total Failure Rate, All GFE		27.8

The failure rates listed above are for the indicated quantity of equipment in a series configuration. Failure rates for avionics equipment were obtained from System Specification AMC-SS-2222-10000D. The failure rate of the T700 engines was estimated from the performance of the YT700 engines during DT/OT II.

TABLE 4. ESTIMATED MISSION ABORTING FAILURE RATE OF GOVERNMENT FURNISHED EQUIPMENT (GFE) OF THE UTTAS PRODUCTION CONFIGURATION

ITEM DESCRIPTION	AIRCRAFT ON AIRCRAFT	MISSION ABORTING FAILURE RATE (ABORTS PER 1000 HOURS)
Transponder Set, AN/APX-1000	1	.11
VHF-FM Radio Set, AN/ARC-114	1	.15
UHF-AM Radio Set, AN/ARC-164	1	.07
Lightweight Doppler Navigation System, AN/ASN-128	1	.31
VOR LOC, GS/MB AN/ARN-123	1	.10
Absolute Altimeter AN/APN-209	1	.11
Communication Security Set, TSEC/KY-28	3	.21
Computer, MARK XII, KIT-1A/TSEC	1	.03
Voice Gating Circuit, MD 954	4	.08
ADF Compensation, CN 1404	1	.02
General Electric T700 Engine	2	9.0
Total Mission Aborting Failure Rate, All GFE		10.19

The failure rates listed above are for the quantity of equipment indicated in a series configuration. The mission abort failure rate of the avionics equipment was obtained by applying a mission reliability factor (MRF) of 0.10 to the mission affecting failure rates listed in System Specification AMC-SS-2222-10000D. The mission abort failure rate of the T700 engines was estimated from the performance of the YT700 engines during DT/OT II.

A combat mission abort rate of 5.4 aborts per 1000 hours for the T700 engines has been used in the assessment of combat mission reliability.

TABLE 5. ESTIMATED CORRECTIVE MAINTENANCE FOR GOVERNMENT FURNISHED EQUIPMENT (GFE) OF THE UTTAS PRODUCTION CONFIGURATION

ITEM DESCRIPTION	QUANTITY ON AIRCRAFT	CORRECTIVE MAINTENANCE MANHOURS PER 1000 FLIGHT HOURS: UNIT LEVEL (AVUM)	INTERMEDIATE LEVEL (AVIM)
Transponder Set, AN/APX-100	1	0.5	6.6
VHF-FM Radio Set, AN/ARC-114	1	0.6	19.8
UHF-AM Radio Set, AN/ARC-164	1	0.2	1.1
Lightweight Doppler Navigation System AN/ASN-128	1	1.0	18.1
VOR LOC, GS/MB AN/ARN-123	1	0.4	0.4
Absolute Altimeter AN/APN-209	1	0.4	11.9
Communication Security Set, TSEC/KY-28	3	0.8	23.2
Computer, MARK XII, Kit-1A/TSEC	1	0.1	13.8
Voice Gating Circuit, MD 954	4	0.3	0.7
ADF Compensation CN 1404	1	0.1	0.3
T700 Engine	2	110.0	14.3
Total Corrective Maintenance Manhours per 1000 Flight Hours, All GFE		114.4	109.8

The corrective maintenance manhours per flight hour estimates for avionics equipment were obtained from System Specification AMC-SS-2222-10000D. The AVUM manhours per event for avionics equipment as given by the System Specification was increased by 0.20 manhours to account for removal/replacement time. The corrective maintenance manhours per flight hour estimates for the T700 engines were obtained from an assessment of the performance of the YT700 engines during DT/OT II.

TABLE 6. DOWNTIME OF GOVERNMENT FURNISHED EQUIPMENT (GFE) OF THE UTTAS PRODUCTION CONFIGURATION

EQUIPMENT	DOWNTIME PER FLIGHT HOUR (HOURS)
All Avionics	.001
T700 Engines	.060
Total, All GFE	.061

The downtime per flight hour for avionics was derived from the mission affecting failure rate of avionics and AVUM level maintenance per event as given in System Specification AMC-SS-2222-10000D.

The downtime for the T700 engines was obtained from an assessment of the performance of the YT700 engine during DT/OT II.

TABLE FAULT CORRECTIVE MAINTENANCE MANHOURS PER FLIGHT HOUR FOR GOVERNMENT FURNISHED EQUIPMENT (GFE) OF UTTAS PRODUCTION CONFIGURATION

EQUIPMENT	FAULT CORRECTIVE MAINTENANCE MANHOURS PER FLIGHT HOUR
All Avionics	.10
T700 Engines	.08
Total, All GFE	.18

The difference in fault corrective and total corrective maintenance for avionics was assumed to be negligible. Therefore, the fault corrective maintenance for avionics was assigned the value for avionics total corrective maintenance in System Specification AMC-SS-2222-10000D.

The fault corrective maintenance for the T700 engines was assessed from the maintenance required to correct the failures of the T700 engine which were charged by the YT700 Engine Scoring Committee.

TABLE 7. ESTIMATED SCHEDULED MAINTENANCE FOR GOVERNMENT FURNISHED EQUIPMENT (GFE) OF UTTAS PRODUCTION CONFIGURATION

EQUIPMENT	SCHEDULED MAINTENANCE MANHOURS PER FLIGHT HOUR
All Avionics	.09
T700 Egnines	.06
Total, All GFE	.15

The estimates above were obtained from System Specification AMC-SS-2222-10000D.

APPENDIX 6

MEMORANDA FROM THE DEPUTY SECRETARY OF DEFENSE AND DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING

DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING
WASHINGTON, D.C. 20301

2 FEB 1976

MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY
(RESEARCH AND DEVELOPMENT)

SUBJECT: UTTAS Program

In response to your memorandum of 18 January 1976, this office interposes no objection to the UTTAS program entering Government Competitive Testing (GCT) according to the Army's current schedule.

The recent apparent improvement in aircraft Mean Time Between Failure (MTBF), as briefed by the UTTAS Project Manager, does not relieve the Army from the goals and thresholds established in the DCP. Accordingly, the Army is requested to ensure the timely availability of reliability and maintainability data and the previously requested operating and support cost estimates.

Of concern is the project manager's conclusion that MMH/FH, MTBR and mission reliability are more critical than MTBF in evaluating total system worth. As you know, MTBF has been used as a major factor in establishing desired reliability in several recent helicopter programs, i.e., AAH and HLH. It has provided a parameter against which reliability can be evaluated/measured during the relatively short development period. If there are better, more significant parameters, then these should be further developed and thresholds and testing methods established. Your views on this matter would be appreciated.

MALCOLM R. CURRIE

THE DEPUTY SECRETARY OF DEFENSE
WASHINGTON, D. C. 20301

28 FEB 1976

MEMORANDUM FOR The Secretaries of the Military Departments

SUBJECT: Reduction of Outyear Operating and Support (O&S) Costs

I am seriously concerned with the continuing growth of the fraction of the total DoD resources needed to operate and support our weapons and the decline in funds for new weapon procurement. A means to increase real DoD purchasing power is to increase emphasis on controlling the outyear operating and support costs of weapon systems during the development and acquisition phase both through attention to design, procurement, and support planning. We must have the dual objectives of reducing the fraction of the outyear DoD budget allocated to weapon O&S costs while at the same time maintaining operational readiness.

My 16 October 1975 memorandum to you, Subject: Visibility and Management of Support Costs (MBO 9-2), described one important aspect of this action plan - improving the visibility and management of support costs. While I am confident that we can achieve the ability to identify and track those costs, I am equally concerned that insufficient attention is being paid to controlling eventual system O&S costs during conceptual, validation and full-scale development phases of new systems. My objective is to achieve an overall reduction in the fraction of each Service's outyear budget allocated to O&S cost in the outyears by focusing now on reducing the O&S costs of the new systems we are developing.

Specifically, I am requesting that each Service establish O&S cost targets for each system in development to support the above objective and follow up on the achievement of such targets. For the near term, the approach should be to identify in the DCP/DSARC process, the incremental O&S cost impact of each weapon decision (in terms of the O&S cost impact of planned replacement or augmentation of a function), and to

periodically assess the extent to which the decisions taken collectively support the broad objective. Any net growth would then require tradeoffs to support the objective of overall reduction of the O&S cost fraction in the outyears. Such could include a search for more effective support concepts as well as conceptual and design tradeoffs to meet the need. Decisions on new weapons will be heavily influenced by the extent to which each program contributes to the objective.

The attachment provides guidance in the areas where attention should be focused for greatest payoff. I expect this guidance to be applied at all levels of the Services and that progress toward meeting the objective will be reviewed at the highest levels. I will need your full support to make this policy succeed. From this time, each DSARC review is to specifically address the O&S cost impact of new systems compared to those to be replaced or augmented; and efforts which have been made or are required to achieve a net outyear reduction whenever feasible. Within three months I would like to have your planned approach to establishment of O&S cost goals for all major programs now in the DSARC process (with emphasis on those prior to DSARC II) and the methodology for an annual assessment of the net O&S cost impact of decisions in the prior year. The first such assessment could be submitted for my review a year from this date.

W. P. CLEMENTS JR.

APPENDIX 7

RELIABILITY GROWTH OF THE UTTAS DURING THE FULL SCALE DEVELOPMENT PHASE

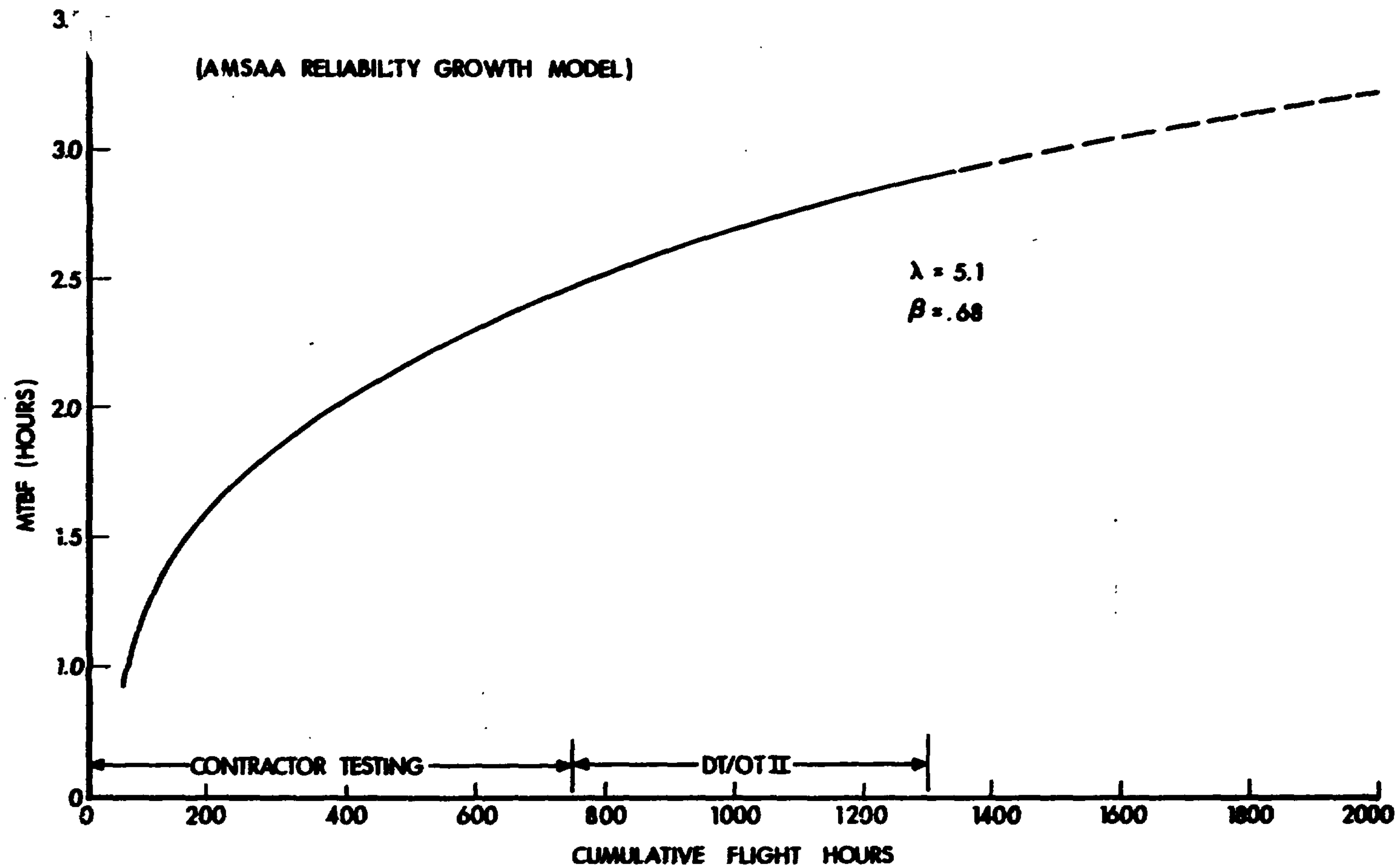

Figure Boeing UTTAS Reliability Growth-All Flight Testing.

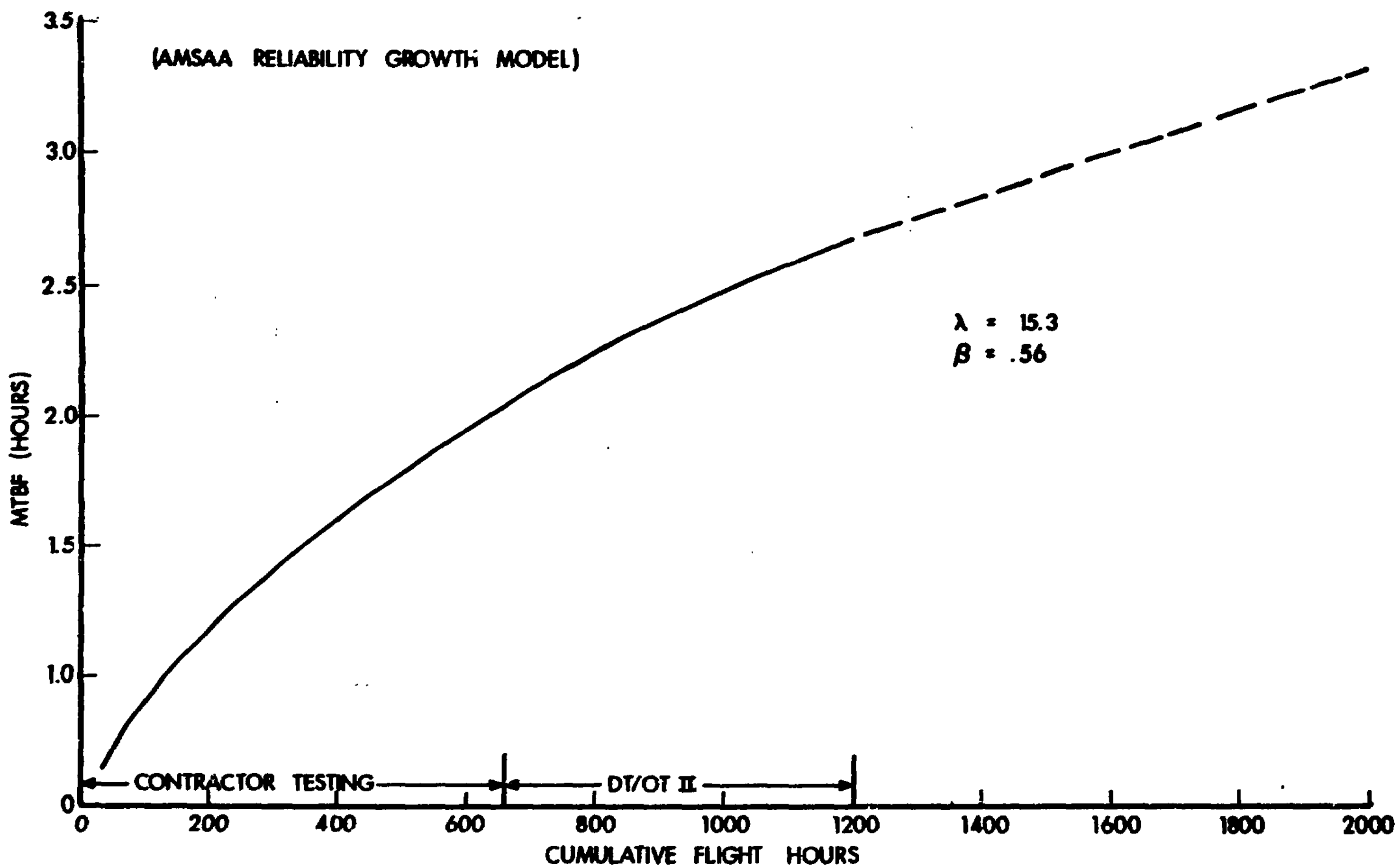

Figure Sikorsky UTTAS Reliability Growth - All Flight Testing.

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APPENDIX 8

FAILURES OF THE YT700 ENGINE
DURING DT/OT II

SUMMARY - BOEING/VERTOL - YT700 ENGINE FAILURES - DT/OT II

A/C V56

Control No.	Event	Disposition
6085-V56-004C	Anti-ice Valve Sticks	Not Chargeable
6088-V56-002B	Anti-ice Valve Sticks	Not Chargeable
6103-V56-002D	Anti-ice Valve Sticks	Not Chargeable
6115-V56-004Z	HMU Fuel Sched Shift	Chargeable - Class 4
6131-V56-002B	#3 Bearing Failure	Chargeable - Class 2
Eng S/N 212 removed, Eng S/N 206 installed, position #1		
6160-V56-001D	Low Power & Torque	Not Chargeable
Eng S/N 206 removed, Eng S/N 230 installed, position #1		
6163-V56-001B	Anti-ice Valve Opens	Not Chargeable
End of DT-2		
6182-V56-013Z	T4.5 Harness Broken	Not Chargeable
6183-V56-004B	Replace Igniter Plug	Not Chargeable
6204-V56-014Z	Replace Oil Filter Cap	Not Chargeable
6230-V56-006A	Anti-ice Valve Opens	Not Chargeable
6237-V56-002A	Change HMU	Not Chargeable
6238-V56-005A	Heavy Oil Leak	Not Chargeable
Eng S/N 232 removed, Eng S/N 277 installed, position #2		
End of OT-2		

SUMMARY - BOEING/VERTOL - YT700 ENGINE FAILURES - DT/OT II

A/C V57

Control No.	Event	Disposition
6085-V57-013Z	C Sump Shield Cracked	Not Chargeable
6094-V57-004B	C Sump Shield Cracked	Not Chargeable
6104-V57-009B	Dirty Connector	Chargeable - Class 5
6117-V57-040Z	Chaffed Oil Line	Not Chargeable
6120-V57-024Z	C Sump Shield Cracked	Not Chargeable
6120-V57-026Z	C Sump Shield Cracked	Not Chargeable
6126-V57-007Z	Yellow Harness Short	Chargeable - Class 5
6131-V57-002A	Broken Oil Line	Not Chargeable

Eng S/N 210 removed, Eng S/N 203 installed, position #1

End of DT-2

6170-V57-001B	Igniter Plug Replaced	Not Chargeable
6188-V57-015Z	T4.5 Harness Broken	Not Chargeable
6190-V57-003Z	C Sump Cover Cracked	Not Chargeable
6194-V57-012B	PTO Failure	Chargeable - Class 2

Eng S/N 203 removed, Eng S/N 225 installed, position #1

6210-V57-005Z	T4.5 Harness Broken	Not Chargeable
6210-V57-010A	#4 Bearing Failure	Not Chargeable

Eng S/N 221 removed, Eng S/N 210 installed, position #2

6215-V57-010C	Foreign Object Damage	Not Chargeable

Eng S/N 210 removed, Eng S/N 219 installed, position #2

SUMMARY - BOEING/VERTOL - YT700 ENGINE FAILURES - DT/OT II

A/C V57 (Continued)

Control No.	Event	Disposition
6232-V57-0127	T4.5 Harness Broken	Not Chargeable
6233-V57-001E	Stuck Torque Tube	Not Chargeable
Eng S/N 225 removed, Eng S/N 221 installed, position #1		
6238-V57-008A	Torque Indication	Pending GE
6239-V57-006B	Torque Fluctuation	Not Chargeable
6246-V57-006Z	C Sump Cover Cracked	Not Chargeable

End of OT-2

SUMMARY - SIKORSKY - YT700 ENGINE FAILURES - DT/OT II

A/C S50

Control No.	Event	Disposition
6099-S50-008Z	Fuel Filter Button Pop	Not Chargeable
6106-S50-005Z	Fuel Filter Button Pop	Not Chargeable
6124-S50-001B	Contaminated HMU	Chargeable - Class 2

Eng S/N 220 removed, Eng S/N 205 installed, position #2

Control No.	Event	Disposition
6126-S50-002B	No Ignition - Faulty Exciter	Chargeable - Class 4
6127-S50-008Z	Sump Drain Leak	Not Chargeable
6127-S50-009Z	Sump Drain Leak	Not Chargeable
6161-S50-004A	HMU Fuel Pump Failure	Not Chargeable
6163-S50-001C	No Ignition - Faulty Exciter	Chargeable - Class 4

End of DT-2

Control No.	Event	Disposition
6171-S50-002A	HMU Replaced - Sluggish Np	Chargeable - Class 4
6180-S50-002B	Faulty Overtemp Indic.	Not Chargeable
6180-S50-003A	Faulty Overtemp Indic.	Not Chargeable
6183-S50-001D	T4.5 Harness Broken	Not Chargeable
6183-S50-003Z	History Recorder Faulty	Not Chargeable
6195-S50-008Z	Faulty Overtemp. Indic.	Not Chargeable
6217-S50-002A	PTO Failure	Chargeable - Class 2

Eng S/N 205 removed, Eng S/N 201 installed, position #2

End of OT-2

SUMMARY - SIKORSKY - YT700 ENGINE FAILURES - DT/OT II

A/C S52

Control No.	Event	Disposition
6084-S52-023Z	Faulty Overtemp Indic.	Not Chargeable
6104-S52-006B	Fuel Filter Button Pop	Not Chargeable
6104-S52-006C	Fuel Filter Button Pop	Not Chargeable
6110-S52-003Z	Fuel Filter Button Pop	Not Chargeable
6113-S52-004B	Swirl Frame Drain Leak	Not Chargeable
6119-S52-003Z	Fuel Filter Button Pop	Not Chargeable
6124-S52-004B	Swirl Frame Drain Leak	Not Chargeable
6132-S52-010Z	Fuel Filter Button Pop	Not Chargeable
6132-S52-011Z	Starter Pad Leakage	Not Chargeable
6133-S52-001A	Green Harness Short	Chargeable - Class 5

End of DT-2

6175-S52-003Z	Faulty Overtemp Indic.	Not Chargeable
6176-S52-003A	#3 Bearing Failure	Not Chargeable

Eng S/N 231 removed, Eng S/N 224 installed, #2 position

6233-S52-026Z	T4.5 Harness Broken	Not Chargeable

End of OT-2

YT700 ENGINE CHARGEABLE FAILURES - DT/OT II

Control No.	Event	Class
6115-V56-004Z	HMU Fuel Sched Shift	4
6131-V56-002B	#3 Bearing Failure	2
6104-V57-009B	Dirty Connector	5
6126-V57-007Z	Yellow Harness Short	5
6194-V57-012B	PTO Failure	2
6124-S50-001B	Contaminated HMU	2
6126-S50-002B	No Ignition	4
6163-S50-001C	No Ignition	4
6171-S50-002A	HMU - Sluggish Np	4
6217-S50-002A	PTO Failure	2
6133-S52-001A	Green Harness Short	5

YT700 ENGINE REMOVALS - DT/OT II

Boeing Vertol Aircraft V56

S/N 212 removed, S/N 206 installed, position #1
S/N 206 removed, S/N 230 installed, position #1
S/N 232 removed, S/N 277 installed, position #2

Boeing Vertol Aircraft V57

S/N 210 removed, S/N 203 installed, position #1
S/N 203 removed, S/N 225 installed, position #1
S/N 221 removed, S/N 210 installed, position #2
S/N 210 removed, S/N 219 installed, position #2
S/N 225 removed, S/N 221 installed, position #1

Sikorsky Aircraft S50

S/N 220 removed, S/N 205 installed, position #2
S/N 205 removed, S/N 201 installed, position #2

Sikorsky Aircraft S52

S/N 231 removed, S/N 224 installed, position #2

YT700 ENGINE RELIABILITY DEFINITIONS

1. MTBF (Mean Time Between Failure). The total engine operating time of a population of engines divided by the total number of relevant events of engine failure experienced within the population during the measurement interval.

2. MTBR (Mean Time Between Removal). The total engine operating time of a population of engines divided by the total number of unscheduled engine removals.

3. Failure. Inability to perform required function within specified limits.

4. Primary Failure. An independent failure, not as a result of another failure.

5. Secondary Failure. Any failure within the engine which was the result of some other failure.

6. Power Loss. Inability to obtain and/or sustain at least 90 percent of the desired power level.

7. Failure Classes. Class I - Failures that result in destruction of an engine or loss of aircraft control or fire external to the engine.

   Class II- Failures which result in In-Flight shutdown (i.e., unrecoverable power loss).

   Class III- Failures which result in potential power losses completely or partially rectified by automatic or manual corrective action.

   Class IV- Failures which result in power loss or no start.

   Class V - Failure which requires unscheduled maintenance action.

8. <u>Excluded Failures</u>.

(a) Failures resulting from errors of maintenance personnel.

(b) Failures resulting from operating the engine beyond specification limits. Included failures are those operationally related failures for which engine provides integral protective devices (overspeed, overtemperature, hot starts).

(c) Failures resulting from airframe components.

(d) Failures to start if a successful start is accomplished without corrective maintenance action.

(e) Reported operating malfunctions which cannot be verified by subsequent investigation, flight or ground test.

(f) Multiple part removals and other maintenance actions performed upon the same engine following an initial failure requiring maintenance action will be counted as one failure against the engine.

(g) Failures of equipment not furnished by the engine contractor.

(h) Failures for which a corrective engine design change or an operational procedure change has been demonstrated, and approved by the Government, will be removed from the failure count, unless the events are identical to those for which corrective action was taken and it has been determined that the prescribed corrective action procedures have been utilized.

APPENDIX 9

FAILURE RATES OF UTTAS COMPONENTS MODIFIED
DURING DT/OT II

DT II/OT II FAILURE RATES OF COMPONENTS MODIFIED DURING DT II ON SIKORSKY AIRCRAFT S50 AND S52

MODIFIED COMPONENT	PRE-MODIFICATION FAILURES PER FLIGHT HOUR	POST MODIFICATION FAILURES PER FLIGHT HOUR
Avionics Intake Screen	—	—
GCU	0.0084	0.0008
Fuel Selector Valves	—	—
Bifilar Tapered Washers	0.0035	0.0000
Strobe Light Screws	—	—
Tail Rotor Dust Boots	0.0157	0.0000
Forward Support Tube	—	—
Tail Rotor Cable Guide	—	—
Holein Tail Cone for T/R Cable	0.0034	0.0000
Inspection Hole in Stabilator Mount Point Cover Plates	0.0051	0.0000
Tail Wheel Locking Pin Catch	0.0101	0.0000
M/R Bonding Jumpers	0.0042	0.0015
New Glue on Velcro O/H Sound Proofing	—	—
Fuel Selector Valves (2nd Mod.)	—	—
O/H Sound Proofing	0.0034	0.0076
Engine Starter Jaws	0.0083	0.0053
Cabin Door Vent Handle	—	—
Fuel Check Valves	—	—
Updated Master Trim Panel	—	—
Hydraulic System Cooling Line	—	—
Hydraulic Pump Module Quick Disconnects	—	—
Pilot Assist Module Flow Regulator	—	—
Stabilator Mount Fairing	—	—
TOTALS	0.0621	0.0152

DT II/OT II FAILURE RATES OF COMPONENTS MODIFIED DURING OT II ON SIKORSKY AIRCRAFT S50 AND S52

MODIFIED COMPONENT	PRE-MODIFICATION FAILURES PER FLIGHT HOUR	POST MODIFICATION FAILURES PER FLIGHT HOUR
O/H Sound Proofing (Nut Plates)	0.0053	0.0000
Seat Belts	0.0050	0.0000
T/R Servo Pressure Lines Bleed Port	—	—
Collective Pitch Control Stick	—	—
Stabilator Mounting Bolts	—	—
M/R Blade Bonding Doublers	0.0006	0.0100
Access Hole in APU Panel	—	—
TOTALS	0.0109	0.0100

DT II/OT II FAILURE RATES OF COMPONENTS MODIFIED DURING DT II ON BOEING AIRCRAFT V56 AND V57

MODIFIED COMPONENT	PRE-MODIFICATION FAILURES PER FLIGHT HOUR	POST MODIFICATION FAILURES PER FLIGHT HOUR
Tail Rotor Blades	—	—
Pitch Change Link Bolts	0.0023	0.0000
SCAS Boxes	0.0000	0.0052
EAPS Duct	0.0037	0.0000
M/R Blade Pendabs	0.0009	0.0006
Crown Windows	0.0023	0.0000
Maintenance Crane Support Structure	—	—
Sound Proofing	0.0000	0.0042
Utility Light Mount Bases	—	—
Cabin Doors	0.0000	0.0028
M/R Hub Seals	0.0066	0.0000
TOTALS	0.0158	0.0128

DT II/OT II FAILURE RATES OF COMPONENTS MODIFIED DURING OT II ON BOEING AIRCRAFT V56 AND V57

MODIFIED COMPONENTS	PRE-MODIFICATION FAILURES PER FLIGHT HOUR	POST MODIFICATION FAILURES PER FLIGHT HOUR
Hand Guards	0	0
Engine Transmission	0	0
Fuel Totalizer and Flow Indicator	0	0
TOTALS	0	0

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APPENDIX 10

FAILURE RATES OF UTTAS COMPONENTS WHICH EACH EXPERIENCED MORE THAN ONE FAILURE DURING DT/OT II

COMPARISON OF DT II/OT II REPEATED SYSTEM FAILURES FOR BOTH BOEING AIRCRAFT V56 AND V57

FAILED COMPONENT	NUMBER OF FAILURES DT II	OT II
Output Bellcrank	0	2
APU Exhaust Bracket	3	2
Crew Mike Cord/Switch	7	6
Formation/Navigation/Strobe Light	8	5
Tail Rotor Drive Shaft Barry Mounts	0	2
Engine XMSN Lines	2	4
Cargo Door Rollers	3	2
Actuator	2	2
FM Homing Wire	3	0
Crown Latch	3	0
Main Rotor Hub	2	0
SCAS Box	3	1
Power Supply	2	0
Engine Cowling Camlocks/Latch	3	1
EAPS Duct	4	0
Overhead Panel Wires	2	1
Main Rotor Blade Patch	3	0
Lower Gunner's Window	3	1
Cruise Guide Wiring	2	1
IFDS	2	0
TOTAL	57	30

COMPARISON OF REPEATED SYSTEM FAILURES FOR BOTH SIKORSKY AIRCRAFT
S50 AND S52

FAILED COMPONENT	NUMBER OF FAILURES DT II	OT II
Main Gear Lower Dust Boots	0	2
Main Rotor Damper Boot	4	2
Cargo Doors and Tracks	0	4
Stabilator Upper Mount	6	3
Number Two Engine Mounts	1	3
Main Rotor Tip Caps/Doubler	1	4
Bonding Strap	5	4
Position/Formation Lights	8	9
Stabilizer Amplifier	0	2
Vent Blower Fan	0	2
Troop Seat Support Cable	0	4
Seat Belt	2	2
Floor Mike Switch	11	2
APU Start Nozzle	0	2
GCU	6	0
Actuator	5	0
Engine Bleed Air Line	2	0
Tail Rotor Dust Boots	4	0
Pneumatic Engine Starter	4	3
Power Supply	6	0
FAS Computer/Servo	4	1
Transfer Module Solenoid Valve	3	0
Tail Wheel Locking Pin	3	0
Engine Exhaust Fairing	4	2
Upper Droop Stop Spring	2	0
APU Start Fuel Nozzle	0	2
Stabilator Cracks	3	0
TOTAL	84	53

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APPENDIX 11

MISSION ABORT EVENTS DURING DT/OT II

TABLE SIKORSKY MISSION ABORTS - DT/OT II

MALFUNCTION CAUSING ABORT	CORRECTIVE ACTION
Cyclic stick jumps left when trim switch is turned on	Replaced roll trim actuator
Pressure low in main rotor blade spar - Blade Inspection Method (BIM) diagnostic warning (two occurrences)	Main rotor blade replaced
No rotor speed indication (three occurrences)	Rotor speed sensor replaced
Number 1 engine would not start	Number 1 engine start valve replaced
Pilot's door opened in flight - door handle control tube broke off	Replaced door handle control tube
APU generator would not come on line	Replaced APU generator control unit
Pressure lost in number 2 hydraulic system and backup hydraulic pump (two occurrences)	Tightened loose bolts holding solenoid valve cover. Bolts safety wired after second occurrence.
Backup hydraulic pump filter button popped	Replaced filter
Main transmission oil pressure fluctuating	Replaced oil pressure transmitter
Number 2 engine would not start	Replaced broken wire on engine start abort switch
Number 1 hydraulic system return filter button popped	Replaced filter and filter bowl
Restriction in cyclic movement	Replaced primary servo
Stabilator failure	Replaced stabilizer amplifier
Main rotor blade debonding in flight	Replaced main rotor blade
Tail gearbox chip light came on	Cleaned chip detector magnetic plug
APU flamed out	APU replaced
Closed circuit refueling nozzle would not seal after nozzle was removed	Closed circuit fueling port was replaced
Number 2 primary servo pressure caution light and boost servo caution light came on	Hydraulic pump module replaced
Engine Control Unit (ECU) lockout	Repaired wiring of engine control lever

TABLE BOEING MISSION ABORTS - DT/OT II

MALFUNCTION CAUSING ABORT	CORRECTIVE ACTION
Auxiliary Power Unit (APU) underspeed	Acceleration control unit replaced
Severe vibration in flight	No corrective action
Tail returns to back position in flight	Number 2 Stability Control Augmentation System (SCAS) box replaced
Number 1 engine transmission oil pressure low (two occurrences)	Replaced hose joint at transmission oil cooler
Loose retaining pin on number 2 pendulum absorber	Retaining pin tightened
APU underspeed	Wiring of APU generator control unit replaced
Cargo hook squid released	Replaced wiring
Number 1 engine will not motor	Replaced air starter motor
Number 2 engine will not motor	Tightened number 2 engine control level cannon plug
Copilots overhead corner window popped out	Window repositioned and taped. Modified window later installed
Number 2 hydraulic pressure caution light came on.	Switching valve was dirty. System purged itself after mechanic operated the switching valves.
Number 2 engine flamed out while starting	Repaired ground wire to the fuel shut off valve.
Copilot's windshield broke in flight	Modified plexiglass windows installed
Pendulum absorber flew off in flight	Replaced pendulum absorber
Crack in tail rotor blade	Replaced tail rotor blade
Number 1 SCAS circuit breaker popped, failing tail.	SCAS wiring replaced.

TABLE MISSION ABORTS CHARGEABLE TO T700 ENGINE - DT/OT II

MALFUNCTION CAUSING ABORT	CORRECTIVE ACTION
Power Take-off (PTO) Assembly failure	Replaced engine
Number 4 bearing failure	Replaced engine
Hydromechnical Unit (HMU)	Replaced engine
No ignition - faulty exciter	Replaced exciter box
Number 3 bearing failure	Replaced engine
Power Take-off (PTO) assembly failure	Replaced engine
Magnetic Chip Light Indication (four occurrences)	Cleaned chip detector plug

APPENDIX 12

SCHEDULED AND UNSCHEDULED MAINTENANCE OF THE BOEING UTTAS DURING DT II CATEGORIZED BY SUBSYSTEM

SCHEDULED MAINTENANCE ON BOEING AIRCRAFT Y56 DURING DT II
BASED ON 114.3 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	—	—	—	—	—	—	—	—	—
Landing Gear	1	0.70	0.70	0.01	1.40	1.40	0.01	0.00	1.49
Power Plant and Pneumatic System	—	—	—	—	—	—	—	—	—
Drive System	12	0.90	0.08	0.01	0.82	0.07	0.01	0.54	1.36
Hydraulic	—	—	—	—	—	—	—	—	—
Instrumentation	—	—	—	—	—	—	—	—	—
Electrical	—	—	—	—	—	—	—	—	—
Fuel	—	—	—	—	—	—	—	—	—
Flight Controls	—	—	—	—	—	—	—	—	—
Utility	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	—	—	—	—	—	—	—	—	—
Auxiliary Power Unit (APU)	—	—	—	—	—	—	—	—	—
Avionics	—	—	—	—	—	—	—	—	—
Armament	—	—	—	—	—	—	—	—	—
Unspecified	125	57.00	0.46	0.50	93.78	0.75	0.82	0.35	94.13
TOTALS	138	58.60	0.42*	0.51	96.00	0.70 *	0.84	0.89	96.89

*Weighted Average
**Maintenance Man-Hours Indirect

UNSCHEDULED MAINTENANCE ON BOEING AIRCRAFT V56 DURING DT II
BASED ON 114.3 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	30	14.00	0.47	0.12	16.50	0.55	0.14	0.20	16.70
Landing Gear	13	3.30	0.25	0.03	3.65	0.28	0.03	0.08	3.73
Power Plant and Pneumatic System	14	9.20	0.66	0.08	13.33	0.95	0.12	1.73	15.06
Drive System	50	14.70	0.29	0.13	21.49	0.43	0.19	0.87	22.36
Hydraulic	21	8.00	0.38	0.07	9.92	0.47	0.09	0.02	9.94
Instrumentation	7	3.30	0.47	0.03	5.33	0.76	0.05	0.00	5.33
Electrical	13	12.70	0.98	0.11	14.18	1.09	0.12	0.00	14.18
Fuel	4	2.20	0.55	0.02	3.22	0.80	0.03	0.03	3.25
Flight Controls	7	5.30	0.76	0.05	8.87	1.27	0.08	0.05	8.92
Utility	2	0.10	0.05	0.00	0.10	0.05	0.00	0.00	0.10
Cargo and Personnel Handling Equipment	2	1.30	0.65	0.01	2.28	1.14	0.02	0.00	2.28
Auxiliary Power Unit (APU)	15	5.20	0.35	0.04	5.41	0.36	0.05	0.04	5.45
Avionics	13	7.80	0.60	0.07	12.12	0.93	0.11	0.00	12.12
Armament	—	—	—	—	—	—	—	—	—
Unspecified	6	1.60	0.27	0.01	2.53	0.42	0.02	0.00	2.53
TOTALS	197	88.70	0.45**	0.78	118.93	0.60**	1.04	3.02	121.95

*Weighted Average
**Maintenance Man-Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED ON BOEING AIRCRAFT V56 DURING DT II
BASED ON 114.3 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	30	14.00	0.47	0.12	16.50	0.55	0.14	0.20	16.70
Landing Gear	14	4.00	0.29	0.04	5.05	0.36	0.04	0.08	5.13
Power Plant and Pneumatic System	14	9.20	0.66	0.08	13.33	0.95	0.12	1.73	15.06
Drive System	62	15.60	0.25	0.14	22.31	0.36	0.20	1.41	23.72
Hydraulic	21	8.00	0.38	0.07	9.92	0.47	0.09	0.02	9.94
Instrumentation	7	3.30	0.47	0.03	5.33	0.76	0.05	0.00	5.33
Electrical	13	12.70	0.98	0.11	14.18	1.09	0.12	0.00	14.18
Fuel	4	2.20	0.55	0.02	3.22	0.80	0.03	0.03	3.25
Flight Controls	7	5.30	0.76	0.05	8.87	1.27	0.08	0.05	8.92
Utility	2	0.10	0.05	0.00	0.10	0.05	0.00	0.00	0.10
Cargo and Personnel Handling Equipment	2	1.30	0.65	0.01	2.28	1.14	0.02	0.00	2.28
Auxiliary Power Unit (APU)	15	5.20	0.35	0.04	5.41	0.36	0.05	0.04	5.45
Avionics	13	7.80	0.60	0.07	12.12	0.93	0.11	0.00	12.12
Armament	—	—	—	—	—	—	—	—	—
Unspecified	131	58.6	0.45	0.51	96.31	0.74	0.84	0.35	96.66
TOTALS	335	147.3	0.44**	1.29	214.93	0.64**	1.88	3.91	218.84

*Weighted Average
**Maintenance Man-Hours Indirect

SCHEDULED MAINTENANCE ON BOEING AIRCRAFT V57 DURING DT II
BASED ON 196.8 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	—	—	—	—	—	—	—	—	—
Landing Gear	—	—	—	—	—	—	—	—	—
Power Plant and Pneumatic System	—	—	—	—	—	—	—	—	—
Drive System	12	2.10	0.18	0.01	2.20	0.18	0.01	0.28	2.48
Hydraulic	—	—	—	—	—	—	—	—	—
Instrumentation	—	—	—	—	—	—	—	—	—
Electrical	1	0.30	0.30	0.00	0.32	0.32	0.00	0.00	0.32
Fuel	—	—	—	—	—	—	—	—	—
Flight Controls	—	—	—	—	—	—	—	—	—
Utility	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	—	—	—	—	—	—	—	—	—
Auxiliary Power Unit (APU)	—	—	—	—	—	—	—	—	—
Avionics	—	—	—	—	—	—	—	—	—
Armament	—	—	—	—	—	—	—	—	—
Unspecified	176	93.30	0.52	0.47	146.78	0.82	0.75	3.56	150.34
TOTALS	191	95.70	0.50*	0.49	149.30	0.78*	0.76	3.64	153.14

*Weighted Average
**Maintenance Man-Hours Indirect

UNSCHEDULED MAINTENANCE ON BOEING AIRCRAFT V57 DURING DT II
BASED ON 196.8 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Airframe	67	58.00	0.87	0.30	81.24	1.21	0.41	0.53	81.77
Landing Gear	5	1.50	0.30	0.01	2.16	0.43	0.01	0.00	2.16
Power Plant and Pneumatic System	37	20.00	0.54	0.10	21.16	0.57	0.11	0.14	21.30
Drive System	187	83.00	0.44	0.42	146.36	0.78	0.74	2.72	149.08
Hydraulic	28	14.30	0.51	0.07	25.07	0.90	0.13	0.52	25.59
Instrumentation	12	21.50	1.79	0.11	33.09	2.76	0.17	0.08	33.17
Electrical	25	18.20	0.73	0.09	20.64	0.83	0.10	0.19	20.83
Fuel	4	11.60	2.90	0.06	16.56	4.14	0.08	0.00	16.56
Flight Controls	1	0.30	0.30	0.00	0.30	0.30	0.00	0.00	0.30
Utility	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	3	3.80	1.27	0.02	4.52	1.51	0.02	0.00	4.52
Auxiliary Power Unit (APU)	9	19.70	2.19	0.10	[illegible].44	2.72	0.12	0.18	24.62
Avionics	37	63.90	1.73	0.32	116.57	3.15	0.59	6.86	123.43
Armament	—	—	—	—	—	—	—	—	—
Unspecified	17	11.40	0.67	0.06	17.36	1.02	0.09	0.00	17.36
TOTALS	432	327.20	0.76**	1.66	509.47	1.18**	2.59	11.22	520.69

*Weighted Average
**Maintenance Man-Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED ON BOEING AIRCRAFT V57 DURING DT II
BASED ON 196.8 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM): ACM	ACM Per Event	ACM Per Flight Hour	Maintenance Man Hours Direct (MMHD): MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI*	MMHD plus MMHI
Airframe	67	58.00	0.87	0.30	81.24	1.21	0.41	0.53	81.77
Landing Gear	5	1.50	0.30	0.01	2.16	0.43	0.01	0.00	2.16
Power Plant and Pneumatic System	37	20.00	0.54	0.10	21.16	0.57	0.11	0.14	21.30
Drive System	199	85.10	0.43	0.43	148.56	0.75	0.76	3.00	151.56
Hydraulic	28	14.30	0.51	0.07	25.07	0.90	0.13	0.52	25.59
Instrumentation	12	21.50	1.79	0.11	33.09	2.76	0.17	0.08	33.17
Electrical	26	18.50	0.71	0.09	20.96	0.81	0.11	0.19	21.15
Fuel	4	11.60	2.90	0.06	16.56	4.14	0.08	0.00	16.56
Flight Controls	1	0.30	0.30	0.00	0.30	0.30	0.00	0.00	0.30
Utility	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	3	3.80	1.27	0.02	4.52	1.51	0.02	0.00	4.52
Auxiliary Power Unit (APU)	9	19.70	2.19	0.10	24.44	2.72	0.12	0.18	24.62
Avionics	37	63.90	1.73	0.32	116.57	3.15	0.59	6.86	123.43
Armament	—	—	—	—	—	—	—	—	—
Unspecified	195	104.70	0.54	0.53	164.14	0.84	0.83	3.56	167.70
TOTALS	623	422.90	0.68**	2.15	658.77	1.06**	3.35	15.06	673.83

*Weighted Average
**Maintenance Man-Hours Indirect

SCHEDULED MAINTENANCE ON BOTH BOEING AIRCRAFT V56 AND V57 DURING DT II
BASED ON 311.1 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI*	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	—	—	—	—	—	—	—	—	—
Landing Gear	1	0.70	0.70	0.00	1.40	1.40	0.00	0.00	1.40
Power Plant and Pneumatic System	—	—	—	—	—	—	—	—	—
Drive System	24	3.00	0.12	0.01	3.02	0.13	0.01	0.82	3.84
Hydraulic	—	—	—	—	—	—	—	—	—
Instrumentation	—	—	—	—	—	—	—	—	—
Electrical	1	0.30	0.30	0.00	0.32	0.32	0.00	0.00	0.32
Fuel	—	—	—	—	—	—	—	—	—
Flight Controls	—	—	—	—	—	—	—	—	—
Utility	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	—	—	—	—	—	—	—	—	—
Auxiliary Power Unit (APU)	—	—	—	—	—	—	—	—	—
Avionics	—	—	—	—	—	—	—	—	—
Armament	—	—	—	—	—	—	—	—	—
Unspecified	303	150.30	0.50	0.48	240.56	0.79	0.77	3.91	244.47
TOTALS	329	154.30	0.47**	0.50	245.30	0.75**	0.79	4.73	250.03

*Weighted Average
**Maintenance Man-Hours Indirect

UNSCHEDULED MAINTENANCE ON BOTH BOEING AIRCRAFT V56 AND V57 DURING DT II
BASED ON 311.1 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM) ACM	ACM Per Event	ACM Per Flight Hour	Maintenance Man Hours Direct (MMHD) MMHD	MMHD Per Event	MMHD Per Flight Hour	** MMHI	MMHD plus MMHI
Airframe	97	72.00	0.74	0.23	97.74	1.00	0.31	0.73	98.47
Landing Gear	18	4.80	0.27	0.02	5.81	0.32	0.02	0.08	5.89
Power Plant and Pneumatic System	52	29.50	0.57	0.10	34.74	0.67	0.11	1.87	36.61
Drive System	239	97.80	0.41	0.31	168.01	0.70	0.54	3.59	171.60
Hydraulic	49	22.30	0.46	0.07	34.99	0.71	0.11	0.54	35.53
Instrumentation	19	24.80	1.30	0.08	38.42	2.02	0.12	0.08	38.50
Electrical	38	30.90	0.81	0.10	34.82	0.92	0.11	0.19	35.01
Fuel	8	13.80	1.72	0.04	19.78	2.47	0.06	0.03	19.81
Flight Controls	8	5.60	0.70	0.02	9.17	1.15	0.03	0.05	9.22
Utility	2	0.10	0.05	0.00	0.10	0.05	0.00	0.00	0.10
Cargo and Personnel Handling Equipment	5	5.10	1.02	0.02	6.80	1.36	0.02	0.00	6.80
Auxiliary Power Unit (APU)	24	24.90	1.04	0.08	29.85	1.24	0.10	0.22	30.07
Avionics	50	71.70	1.43	0.23	128.69	2.57	0.41	6.86	135.55
Armament	—	—	—	—	—	—	—	—	—
Unspecified	20	12.60	0.63	0.04	19.48	0.97	0.06	0.00	19.48
TOTALS	629	415.90	0.66**	1.34	628.40	1.00**	2.02	14.24	642.64

*Weighted Average
**Maintenance Man-Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED ON BOTH BOEING AIRCRAFT V56 AND V57 DURING DT II
BASED ON 311.1 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	97	72.00	0.74	0.23	97.74	1.01	0.31	0.73	98.47
Landing Gear	19	5.50	0.29	0.02	7.21	0.38	0.02	0.08	7.29
Power Plant and Pneumatic System	52	29.50	0.57	0.10	34.74	0.67	0.11	1.87	36.61
Drive System	263	100.80	0.38	0.32	171.03	0.65	0.55	4.41	175.44
Hydraulic	49	22.30	0.46	0.07	34.99	0.71	0.11	0.54	35.53
Instrumentation	19	24.80	1.30	0.08	38.42	2.02	0.12	0.08	38.50
Electrical	39	31.20	0.08	0.10	35.14	0.90	0.11	0.19	35.33
Fuel	8	13.80	1.72	0.04	19.78	2.47	0.06	0.03	19.81
Flight Controls	8	5.60	0.70	0.02	9.17	1.15	0.03	0.05	9.22
Utility	2	0.10	0.05	0.00	0.10	0.05	0.00	0.00	0.10
Cargo and Personnel Handling Equipment	5	5.10	1.02	0.02	6.80	1.36	0.02	0.00	6.80
Auxiliary Power Unit (APU)	24	24.90	1.04	0.08	29.85	1.24	0.10	0.22	30.07
Avionics	50	71.70	1.43	0.23	128.69	2.57	0.41	6.86	135.55
Armament	—	—	—	—	—	—	—	—	—
Unspecified	323	162.90	0.50	0.52	260.04	0.80	0.84	3.91	263.95
TOTALS	958	570.20	0.60**	1.83	873.70	0.91**	2.81	18.97	892.67

*Weighted Average
**Maintenance Man-Hours Indirect

APPENDIX 13

SCHEDULED AND UNSCHEDULED MAINTENANCE OF THE BOEING UTTAS FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE DURING DT II CATEGORIZED BY SUBSYSTEM

SCHEDULED MAINTENANCE ON BOEING AIRCRAFT V56 FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE DURING DT II BASED ON 114.3 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	—	—	—	—	—	—	—	—	—
Landing Gear	—	—	—	—	—	—	—	—	—
Power Plant and Pneumatic System	—	—	—	—	—	—	—	—	—
Drive System	—	—	—	—	—	—	—	—	—
Hydraulic	—	—	—	—	—	—	—	—	—
Instrumentation	—	—	—	—	—	—	—	—	—
Electrical	—	—	—	—	—	—	—	—	—
Fuel	—	—	—	—	—	—	—	—	—
Flight Controls	—	—	—	—	—	—	—	—	—
Utility	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	—	—	—	—	—	—	—	—	—
Auxiliary Power Unit (APU)	—	—	—	—	—	—	—	—	—
Avionics	—	—	—	—	—	—	—	—	—
Armament	—	—	—	—	—	—	—	—	—
Unspecified	2	3.00	1.50	0.03	3.35	1.68	0.03	0.00	3.35
TOTALS	2	3.00	1.50*	0.03	3.35	1.68*	0.03	0.00	3.35

*Weighted Average
**Maintenance Man-Hours Indirect

UNSCHEDULED MAINTENANCE ON BOEING AIRCRAFT V56 FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE DURING DT II BASED ON 114.3 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Airframe	1	0.20	0.20	0.00	0.21	0.21	0.00	0.05	0.26
Landing Gear	—	—	—	—	—	—	—	—	—
Power Plant and Pneumatic System	2	1.10	0.55	0.01	2.99	1.50	0.03	0.00	2.99
Drive System	17	9.60	0.56	0.08	16.12	0.95	0.14	0.81	16.93
Hydraulic	3	1.50	0.50	0.01	1.75	0.58	0.02	0.02	1.77
Instrumentation	1	0.20	0.20	0.00	0.19	0.19	0.00	0.00	0.19
Electrical	5	10.60	2.12	0.09	11.88	2.38	0.10	0.00	11.88
Fuel	1	0.20	0.20	0.00	0.20	0.20	0.00	0.00	0.20
Flight Controls	4	5.00	1.25	0.04	8.49	2.12	0.07	0.02	8.51
Utility	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	—	—	—	—	—	—	—	—	—
Auxiliary Power Unit (APU)	1	0.10	0.10	0.00	0.10	0.10	0.00	0.00	0.10
Avionics	—	—	—	—	—	—	—	—	—
Armament	—	—	—	—	—	—	—	—	—
Unspecified	—	—	—	—	—	—	—	—	—
TOTALS	35	28.50	0.81*	0.25	41.93	1.20*	0.37	0.90	42.83

*Weighted Average

**Maintenance Man-Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED ON BOEING AIRCRAFT V56
FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE DURING DT II BASED ON 114.3 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	1	0.20	0.20	0.00	0.21	0.21	0.00	0.05	0.26
Landing Gear	—	—	—	—	—	—	—	—	—
Power Plant and Pneumatic System	2	1.10	0.55	0.01	2.99	1.50	0.03	0.00	2.99
Drive System	17	9.60	0.56	0.08	16.12	0.95	0.14	0.81	16.93
Hydraulic	3	1.50	0.50	0.01	1.75	0.58	0.02	0.02	1.77
Instrumentation	1	0.20	0.20	0.00	0.19	0.19	0.00	0.00	0.19
Electrical	5	10.60	2.12	0.09	11.88	2.38	0.10	0.00	11.88
Fuel	1	0.20	0.20	0.00	0.20	0.20	0.00	0.00	0.20
Flight Controls	4	5.00	1.25	0.04	8.49	2.12	0.07	0.02	8.51
Utility	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	—	—	—	—	—	—	—	—	—
Auxiliary Power Unit (APU)	1	0.10	0.10	0.00	0.10	0.10	0.00	0.00	0.10
Avionics	—	—	—	—	—	—	—	—	—
Armament	—	—	—	—	—	—	—	—	—
Unspecified	2	3.00	1.50	0.03	3.35	1.68	0.03	0.00	3.35
TOTALS	37	31.50	0.85*	0.28	45.28	1.22*	0.40	0.90	46.18

*Weighted Average
**Maintenance Man-Hours Indirect

SCHEDULED MAINTENANCE ON BOEING AIRCRAFT V57 FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE DURING DT II BASED ON 196.8 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	—	—	—	—	—	—	—	—	—
Landing Gear	—	—	—	—	—	—	—	—	—
Power Plant and Pneumatic System	—	—	—	—	—	—	—	—	—
Drive System	—	—	—	—	—	—	—	—	—
Hydraulic	—	—	—	—	—	—	—	—	—
Instrumentation	—	—	—	—	—	—	—	—	—
Electrical	—	—	—	—	—	—	—	—	—
Fuel	—	—	—	—	—	—	—	—	—
Flight Controls	—	—	—	—	—	—	—	—	—
Utility	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	—	—	—	—	—	—	—	—	—
Auxiliary Power Unit (APU)	—	—	—	—	—	—	—	—	—
Avionics	—	—	—	—	—	—	—	—	—
Armament	—	—	—	—	—	—	—	—	—
Unspecified	2	5.00	2.50	0.02	5.89	2.94	0.03	0.00	5.89
TOTALS	2	5.00	2.50*	0.02	5.89	2.94*	0.03	0.00	5.89

*Weighted Average

**Maintenance Man-Hours Indirect

UNSCHEDULED MAINTENANCE ON BOEING AIRCRAFT V57 FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE DURING DT II BASED ON 196.8 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	3	2.10	0.70	0.01	3.55	1.18	0.02	0.00	3.55
Landing Gear	—	—	—	—	—	—	—	—	—
Power Plant and Pneumatic System	10	3.80	0.38	0.02	4.28	0.43	0.02	0.14	4.17
Drive System	28	58.90	2.10	0.30	121.47	4.34	0.62	2.35	123.82
Hydraulic	5	8.80	1.76	0.04	16.23	3.25	0.08	0.48	16.71
Instrumentation	2	16.90	8.45	0.09	26.79	13.40	0.14	0.08	26.87
Electrical	6	3.60	0.60	0.02	3.80	0.63	0.02	0.00	3.80
Fuel	2	9.80	4.90	0.05	13.49	6.74	0.07	0.00	13.49
Flight Controls	—	—	—	—	—	—	—	—	—
Utility	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	—	—	—	—	—	—	—	—	—
Auxiliary Power Unit (APU)	3	8.50	2.83	0.04	11.63	3.88	0.06	0.07	11.70
Avionics	5	22.20	4.44	0.11	43.43	8.69	0.22	1.82	45.25
Armament	—	—	—	—	—	—	—	—	—
Unspecified	—	—	—	—	—	—	—	—	—
TOTALS	64	134.60	2.10*	0.68	244.67	3.82*	1.24	4.94	249.61

*Weighted Average
**Maintenance Man-Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED ON BOEING AIRCRAFT V57 FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE DURING DT II BASED ON 196.8 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	3	2.10	0.70	0.01	3.55	1.18	0.02	0.00	3.55
Landing Gear	—	—	—	—	—	—	—	—	—
Power Plant and Pneumatic System	10	3.80	0.38	0.02	4.28	0.43	0.02	0.14	4.17
Drive System	28	58.90	2.10	0.30	121.47	4.34	0.62	2.35	123.82
Hydraulic	5	8.80	1.76	0.04	16.23	3.25	0.08	0.48	16.71
Instrumentation	2	16.90	8.45	0.09	26.79	13.40	0.14	0.08	26.87
Electrical	6	3.60	0.60	0.02	3.80	0.63	0.02	0.00	3.80
Fuel	2	9.80	4.90	0.05	13.49	6.74	0.07	0.00	13.49
Flight Controls	—	—	—	—	—	—	—	—	—
Utility	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	—	—	—	—	—	—	—	—	—
Auxiliary Power Unit (APU)	3	8.50	2.83	0.04	11.63	3.88	0.06	0.07	11.70
Avionics	5	22.20	4.44	0.11	43.43	8.69	0.22	1.82	45.25
Armament	—	—	—	—	—	—	—	—	—
Unspecified	2	5.00	2.50	0.02	5.89	2.94	0.03	0.00	5.89
TOTALS	66	139.60	2.12*	0.71	250.56	3.80*	1.27	4.94	255.50

*Weighted Average
**Maintenance Man-Hours Indirect

SCHEDULED MAINTENANCE ON BOTH BOEING AIRCRAFT V56 AND V57 FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE DURING DT II BASED ON 311.1 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	—	—	—	—	—	—	—	—	—
Landing Gear	—	—	—	—	—	—	—	—	—
Power Plant and Pneumatic System	—	—	—	—	—	—	—	—	—
Drive System	—	—	—	—	—	—	—	—	—
Hydraulic	—	—	—	—	—	—	—	—	—
Instrumentation	—	—	—	—	—	—	—	—	—
Electrical	—	—	—	—	—	—	—	—	—
Fuel	—	—	—	—	—	—	—	—	—
Flight Controls	—	—	—	—	—	—	—	—	—
Utility	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	—	—	—	—	—	—	—	—	—
Auxiliary Power Unit (APU)	—	—	—	—	—	—	—	—	—
Avionics	—	—	—	—	—	—	—	—	—
Armament	—	—	—	—	—	—	—	—	—
Unspecified	4	8.0	2.00	0.03	9.24	2.31	0.03	0.00	
TOTALS	4	8.0	2.00*	0.03	9.24	2.31*	0.03	0.00	9.24

*Weighted Average
**Maintenance Man-Hours Indirect

UNSCHEDULED MAINTENANCE ON BOTH BOEING AIRCRAFT V56 AND V57 FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE DURING DT II BASED ON 311.1 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	4	2.30	0.58	0.01	3.76	0.94	0.01	0.05	3.81
Landing Gear	—	—	—	—	—	—	—	—	—
Power Plant and Pneumatic System	12	4.90	0.41	0.02	7.27	0.61	0.02	0.14	7.41
Drive System	45	68.50	1.52	0.22	137.59	3.06	0.44	3.16	140.75
Hydraulic	8	10.30	1.29	0.03	17.98	2.25	0.06	0.50	18.48
Instrumentation	3	17.10	5.70	0.06	26.98	8.99	0.09	0.08	27.06
Electrical	11	14.20	1.29	0.05	15.68	1.42	0.05	0.00	15.68
Fuel	3	10.00	3.33	0.03	13.69	4.56	0.04	0.00	13.69
Flight Controls	4	5.00	1.25	0.02	8.49	2.12	0.03	0.02	8.51
Utility	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	—	—	—	—	—	—	—	—	—
Auxiliary Power Unit (APU)	4	8.60	2.15	0.03	11.73	2.93	0.04	0.07	11.80
Avionics	5	22.20	4.44	0.07	43.43	8.69	0.14	1.82	45.25
Armament	—	—	—	—	—	—	—	—	—
Unspecified	—	—	—	—	—	—	—	—	—
TOTALS	99	163.10	1.65*	0.52	286.60	2.90*	0.92	5.84	292.44

*Weighted Average
**Maintenance Man-Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED ON BOTH BOEING AIRCRAFT V56 AND V57 FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE DURING DT II BASED ON 311.1 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	4	2.30	0.58	0.01	3.76	0.94	0.01	0.05	3.81
Landing Gear	—	—	—	—	—	—	—	—	—
Power Plant and Pneumatic System	12	4.90	0.41	0.02	7.27	0.61	0.02	0.14	7.41
Drive System	45	68.50	1.52	0.22	137.59	3.06	0.44	3.16	140.75
Hydraulic	8	10.30	1.29	0.03	17.98	2.25	0.06	0.50	18.48
Instrumentation	3	17.10	5.70	0.06	26.98	8.99	0.09	0.08	27.06
Electrical	11	14.20	1.29	0.05	15.68	1.42	0.05	0.00	15.68
Fuel	3	10.00	3.33	0.03	13.69	4.56	0.04	0.00	13.69
Flight Controls	4	5.00	1.25	0.02	8.49	2.12	0.03	0.02	8.51
Utility	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	—	—	—	—	—	—	—	—	—
Auxiliary Power Unit (APU)	4	8.60	2.15	0.03	11.73	2.93	0.04	0.07	11.80
Avionics	5	22.20	4.44	0.07	43.43	8.69	0.14	1.82	45.25
Armament	—	—	—	—	—	—	—	—	—
Unspecified	4	8.00	2.00	0.03	9.24	2.31	0.03	0.00	9.24
TOTALS	103	171.10	1.66*	0.55	295.84	2.87*	0.95	5.84	301.68

*Weighted Average
**Maintenance Man-Hours Indirect

APPENDIX 14

SCHEDULED AND UNSCHEDULED MAINTENANCE OF THE BOEING UTTAS DURING DT II CATEGORIZED BY MAINTENANCE FUNCTIONS

SCHEDULED MAINTENANCE ON BOEING AIRCRAFT V56 DURING DT-II BASED ON 114.3 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	** MMHI	MMHD plus MMHI
Inspect	137	58.60	0.43	0.51	95.97	0.70	0.84	0.89	96.86
Test	1	0.00	0.00	0.00	0.03	0.03	0.00	-	0.03
Service	-	-	-	-	-	-	-	-	-
Adjust	-	-	-	-	-	-	-	-	-
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	-	-	-	-	-	-	-	-	-
Remove/Replace	-	-	-	-	-	-	-	-	-
Repair	-	-	-	-	-	-	-	-	-
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	17	6.40	0.38	0.06	19.41	1.14	0.17	0.83	20.24
Fault Location	-	-	-	-	-	-	-	-	-
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/ Assemble	-	-	-	-	-	-	-	-	-
Remove	-	-	-	-	-	-	-	-	-
Modification Work Order	12	3.80	0.32	0.03	7.62	0.64	0.07	112.55	120.17
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Totals	167	68.80	0.41*	0.60	123.03	0.74*	1.08	114.27	237.30

*Weighted Average
**Maintenance Man-Hours Indirect

UNSCHEDULED MAINTENANCE ON BOEING AIRCRAFT V56 DURING DT-II BASED ON 114.3 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI	
Inspect	23	4.70	.204	.04	6.84	0.30	0.06	0.35	7.19
Test	5	1.90	.380	0.02	3.19	0.64	0.03	0.00	3.19
Service	49	4.90	.100	0.04	5.54	0.11	0.05	0.00	5.54
Adjust	38	12.50	.329	0.11	18.71	0.49	0.16	0.65	19.36
Align	-	-	-	-	-	-	-	-	-
Calibrate	1	1.30	1.30	0.01	1.28	1.28	0.01	0.00	1.28
Install	6	0.60	0.10	0.01	0.66	0.11	0.01	0.00	0.66
Remove/Replace	39	39.90	1.02	0.35	51.32	1.32	0.45	1.92	53.24
Repair	20	15.30	0.77	0.13	18.21	0.91	0.16	0.04	18.25
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	2	2.00	1.00	0.02	4.01	2.00	0.04	0.00	4.01
Operation	-	-	-	-	-	-	-	-	-
Lubricate	2	0.20	0.10	0.00	0.22	0.11	0.00	0.00	0.22
Disassemble/ Assemble	-	-	-	-	-	-	-	-	-
Remove	4	0.20	0.05	0.00	0.18	0.04	0.00	0.00	0.18
Modification Work Order	-	-	-	-	-	-	-	-	-
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	4	0.20	0.05	0.00	0.22	0.06	0.00	0.00	0.22
Other	4	5.00	1.25	0.04	8.55	2.14	0.08	0.06	1.56
Totals	197	88.70	0.45*	0.78	118.93	0.60*	1.04	3.02	121.95

*Weighted Average, **Maintenance Man-Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED ON BOEING AIRCRAFT V56
DURING DT-II BASED ON 114.3 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM): ACM	ACM Per Event	ACM Per Flight Hour	Maintenance Man Hours Direct (MMHD): MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Inspect	160	63.30	0.40	0.55	102.81	0.64	0.90	1.24	104.05
Test	6	1.90	0.32	0.02	3.22	0.54	0.03	0.00	3.22
Service	49	4.90	0.10	0.04	5.54	0.11	0.05	0.00	5.54
Adjust	38	12.50	0.33	0.11	18.71	0.49	0.16	0.65	19.36
Align	-	-	-	-	-	-	-	-	-
Calibrate	1	1.30	1.30	0.01	1.28	1.28	0.01	0.00	1.28
Install	6	0.60	0.10	0.01	0.66	0.11	0.01	0.00	0.66
Remove/Replace	39	39.90	1.02	0.35	51.32	1.32	0.45	1.92	53.24
Repair	20	15.30	0.76	0.13	18.21	0.91	0.16	0.04	18.25
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	17	6.40	0.38	0.06	19.41	1.14	0.17	0.83	20.24
Fault Location	2	2.00	1.00	0.02	4.01	2.00	0.03	0.00	4.01
Operation	-	-	-	-	-	-	-	-	-
Lubricate	2	0.20	0.10	0.00	0.22	0.11	0.00	0.00	0.22
Disassemble/ Assemble	-	-	-	-	-	-	-	-	-
Remove	4	0.20	0.05	0.00	0.18	0.04	0.00	0.00	0.18
Modification Work Order	12	3.80	0.32	0.03	7.62	0.63	0.07	112.55	120.17
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	4	0.20	0.05	0.00	0.22	0.05	0.00	0.00	0.22
Other	4	5.00	1.25	0.04	8.55	2.14	0.07	0.06	1.56
Totals	364	157.50	0.43*	1.38	241.96	0.66*	2.12	117.29	359.25

*Weighted Average
**Maintenance Man-Hours Indirect

SCHEDULED MAINTENANCE ON BOEING AIRCRAFT V57 DURING DT-II BASED ON 196.8 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Inspect	188	94.60	0.50	0.48	148.21	0.79	0.75	3.84	152.05
Test	1	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.02
Service	1	0.40	0.40	0.00	0.40	0.40	0.00	0.00	0.40
Adjust	-	-	-	-	-	-	-	-	-
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	-	-	-	-	-	-	-	-	-
Remove/Replace	-	-	-	-	-	-	-	-	-
Repair	-	-	-	-	-	-	-	-	-
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	26	8.80	0.34	0.04	23.99	0.92	0.12	1.76	25.75
Fault Location	-	-	-	-	-	-	-	-	-
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/ Assemble	-	-	-	-	-	-	-	-	-
Remove	-	-	-	-	-	-	-	-	-
Modification Work Order	14	8.40	0.60	0.04	15.44	1.10	0.08	114.37	129.81
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Totals	231	112.90	0.49*	0.57	188.73	0.82*	0.96	119.97	308.70

*Weighted Average, **Maintenance Man-Hours Indirect

UNSCHEDULED MAINTENANCE ON BOEING AIRCRAFT V57 DURING DT-II BASED ON 196.8 FLIGHT HOURS

		Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
Maintenance Function	Number of Events	ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	** MMHI	MMHD plus MMHI
Inspect	20	10.80	0.54	0.05	16.93	0.85	0.09	0.08	17.01
Test	10	4.30	0.43	0.02	6.74	0.67	0.03	0.87	7.61
Service	162	15.30	0.09	0.08	19.14	0.12	0.10	0.05	19.19
Adjust	53	12.80	0.24	0.06	14.60	0.27	0.07	0.28	14.88
Align	1	0.20	0.20	0.00	0.18	0.18	0.00	0.00	0.18
Calibrate	-	-	-	-	-	-	-	-	-
Install	22	4.90	0.22	0.02	5.07	0.23	0.03	0.00	5.07
Remove/Replace	71	124.40	1.75	0.63	226.43	3.19	1.15	4.21	230.64
Repair	76	127.70	1.68	0.65	169.03	2.22	0.86	0.85	169.88
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	4	20.10	5.02	0.10	41.94	10.48	0.21	3.85	45.79
Operation	-	-	-	-	-	-	-	-	-
Lubricate	1	0.10	0.10	0.00	0.05	0.05	0.00	0.00	0.05
Disassemble/ Assemble	4	4.30	1.07	0.02	6.92	1.73	0.03	1.03	7.95
Remove	1	0.20	0.20	0.00	0.20	0.20	0.00	0.00	0.20
Modification Work Order	1	0.60	0.60	0.00	0.59	0.59	0.00	0.00	0.59
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	2	0.30	0.15	0.00	0.27	0.13	0.00	0.00	0.27
Other	5	1.80	0.36	0.01	1.97	0.39	0.01	0.00	1.97
Totals	433	327.80	0.76 *	1.67	510.06	1.18 *	2.59	11.22	521.28

*Weighted Average, **Maintenance Man-Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED ON BOEING AIRCRAFT
Y57 DURING DT-II BASED ON 196.8 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	** MMHI	MMHD plus MMHI
Inspect	208	105.40	0.51	0.54	165.14	0.79	0.84	3.92	169.06
Test	11	4.30	0.39	0.02	6.76	0.61	0.03	0.87	7.63
Service	163	15.70	0.10	0.08	19.54	0.12	0.01	0.05	19.59
Adjust	53	12.80	0.24	0.06	14.60	0.27	0.07	0.28	14.88
Align	1	0.20	0.20	0.00	0.18	0.18	0.00	0.00	0.18
Calibrate	-	-	-	-	-	-	-	-	-
Install	22	4.90	0.22	0.02	5.07	0.23	0.03	0.00	5.07
Remove/Replace	71	124.40	1.75	0.63	226.43	3.19	1.15	4.21	230.64
Repair	76	127.70	1.68	0.65	169.03	2.22	0.86	0.85	169.88
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	26	8.80	0.34	0.04	23.99	0.92	0.12	1.76	25.75
Fault Location	4	20.10	5.02	0.10	41.94	10.48	0.21	3.85	45.79
Operation	-	-	-	-	-	-	-	-	-
Lubricate	2	0.80	0.40	0.00	0.72	0.36	0.00	0.00	0.72
Disassemble/Assemble	4	4.30	1.08	0.02	6.92	1.73	0.03	1.03	7.95
Remove	1	0.20	0.20	0.00	0.20	0.20	0.00	0.00	0.20
Modification Work Order	15	9.00	0.60	0.05	16.03	1.07	0.08	114.37	130.40
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	2	0.30	0.15	0.00	0.27	0.13	0.00	0.00	0.27
Other	5	1.80	0.36	0.01	1.97	0.39	0.01	0.00	1.97
tals	64	440.70	0.66 *	2.24	698.79	1.05*	3.55	131.19	829.98

*Weighted .erage, **Maintenance Man-Hours .ect

SCHEDULED MAINTENANCE ON BOTH BOEING AIRCRAFT V56 AND V57
DURING OT-II BASED ON 311.1 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Inspect	325	153.20	0.47	0.49	244.18	0.75	0.78	4.73	248.91
Test	2	0.00	0.00	0.00	0.05	0.02	0.00	0.00	0.05
Service	1	0.40	0.40	0.00	0.40	0.40	0.00	0.00	0.40
Adjust	-	-	-	-	-	-	-	-	-
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	-	-	-	-	-	-	-	-	-
Remove/Replace	-	-	-	-	-	-	-	-	-
Repair	-	-	-	-	-	-	-	-	-
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	43	15.20	0.35	0.05	43.40	1.01	0.14	2.59	45.99
Fault Location	-	-	-	-	-	-	-	-	-
Operation	-	-	-	-	-	-	-	-	-
Lubricate	1	0.70	0.70	0.00	0.67	0.67	0.00	0.00	0.67
Disassemble/ Assemble	-	-	-	-	-	-	-	-	-
Remove	-	-	-	-	-	-	-	-	-
Modification Work Order	26	12.20	0.47	0.04	23.06	0.89	0.07	226.92	249.98
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Totals	398	181.70	0.46*	0.58	311.76	0.78*	1.00	234.24	546.00

*Weighted Average, **Maintenance Man-Hours Indirect

UNSCHEDULED MAINTENANCE ON BOTH BOEING AIRCRAFT V56 AND V57
DURING DT-II BASED ON 311.1 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM): ACM	ACM Per Event	ACM Per Flight Hour	Maintenance Man Hours Direct (MMHD): MMHD	MMHD Per Event	MMHD Per Flight Hour	** MMHI	MMHD plus MMHI
Inspect	43	15.50	0.36	0.05	23.77	0.55	0.08	0.43	24.20
Test	15	6.20	0.41	0.02	9.93	0.66	0.03	0.87	10.80
Service	211	20.20	0.10	0.06	24.68	0.12	0.08	0.05	24.73
Adjust	31	25.30	0.28	0.08	33.31	0.37	0.11	0.93	34.24
Align	1	0.20	0.20	0.00	0.18	0.18	0.00	0.00	0.18
Calibrate	1	1.30	1.30	0.00	1.28	1.28	0.00	0.00	1.28
Install	28	5.50	0.20	0.02	5.73	0.20	0.02	0.00	5.73
Remove/Replace	110	164.30	1.49	0.53	277.75	2.52	0.89	6.13	283.88
Repair	96	143.00	1.49	0.46	187.24	1.95	0.60	0.89	188.13
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	6	22.10	3.68	0.07	45.95	7.66	0.15	3.85	49.80
Operation	-	-	-	-	-	-	-	-	-
Lubricate	3	0.30	0.10	0.00	0.27	0.09	0.00	0.00	0.27
Disassemble/Assemble	4	4.30	1.08	0.01	6.92	1.73	0.02	1.03	7.95
Remove	5	0.40	0.08	0.00	0.38	0.08	0.00	0.00	0.38
Modification Work Order	1	0.60	0.60	0.00	0.59	0.59	0.00	0.00	0.59
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	6	0.50	0.08	0.00	0.49	0.08	0.00	0.00	0.49
Other	9	6.90	0.77	0.02	10.52	1.17	0.03	0.06	10.58
Totals	630	416.50	0.66 *	1.34	628.99	1.00 *	2.02	14.24	643.23

*Weighted Average, **Maintenance Man-Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE ON BOTH BOEING AIRCRAFT
V56 AND V57 DURING DT-II BASED ON 311.1 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Inspect	368	168.70	0.46	0.54	267.95	0.73	0.86	5.16	273.11
Test	17	6.20	0.36	0.02	9.98	0.59	0.03	0.87	10.85
Service	212	20.60	0.10	0.07	25.08	0.12	0.08	0.05	25.13
Adjust	91	25.30	0.28	0.08	33.31	0.37	0.11	0.93	34.24
Align	1	0.20	0.20	0.00	0.18	0.18	0.00	0.00	0.18
Calibrate	1	1.30	1.30	0.00	1.28	1.28	0.00	0.00	1.28
Install	28	5.50	0.20	0.02	5.73	0.20	0.02	0.00	5.73
Remove/Replace	110	164.30	1.49	0.53	277.75	2.52	0.89	6.13	283.88
Repair	96	143.00	1.49	0.46	187.24	1.95	0.60	0.89	188.13
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	43	15.20	0.35	0.05	43.40	1.01	0.14	2.59	45.99
Fault Location	6	22.10	3.58	0.07	45.95	7.66	0.15	3.85	49.80
Operation	-	-	-	-	-	-	-	-	-
Lubricate	4	1.00	0.25	0.00	0.94	0.23	0.00	0.00	0.94
Disassemble/ Assemble	4	4.30	1.07	0.01	6.92	1.73	0.02	1.03	7.95
Remove	5	0.40	0.08	0.00	0.38	0.77	0.00	0.00	0.38
Modification Work Order	27	12.80	0.47	0.04	23.65	0.88	0.08	226.92	250.57
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	6	0.50	0.08	0.00	0.49	0.08	0.00	0.00	0.49
Other	9	6.80	0.76	0.02	7.05	0.78	0.02	0.06	7.11
Totals	1028	598.20	0.58*	1.92	940.75	0.91*	3.02	248.48	1189.23

*Weighted Average, **Maintenance Man-Hours Indirect

APPENDIX 15

SCHEDULED AND UNSCHEDULED MAINTENANCE OF THE BOEING UTTAS FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE DURING DT II CATEGORIZED BY MAINTENANCE FUNCTION

SCHEDULED MAINTENANCE ON BOEING AIRCRAFT V56 FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE DURING DT-II BASED ON 114.3 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Inspect	2	3.00	1.50	0.03	3.35	1.67	0.03	0.00	3.35
Test	-	-	-	-	-	-	-	-	-
Service	-	-	-	-	-	-	-	-	-
Adjust	-	-	-	-	-	-	-	-	-
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	-	-	-	-	-	-	-	-	-
Remove/Replace	-	-	-	-	-	-	-	-	-
Repair	-	-	-	-	-	-	-	-	-
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	-	-	-	-	-	-	-	-	-
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/Assemble	-	-	-	-	-	-	-	-	-
Remove	-	-	-	-	-	-	-	-	-
Modification Work Order	4	0.70	0.17	0.01	0.71	0.18	0.01	62.08	62.79
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Totals	6	3.70	0.62*	0.03	4.06	0.68*	0.04	62.08	66.14

*Weighted Average, **Maintenance Man-Hours Indirect

UNSCHEDULED MAINTENANCE ON BOEING AIRCRAFT V56 FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE DURING DT-II BASED ON 114.3 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Inspect	8	0.80	0.10	0.01	1.75	0.22	0.02	0.21	1.96
Test	-	-	-	-	-	-	-	-	-
Service	2	0.30	0.15	0.00	0.44	0.22	0.00	0.00	0.44
Adjust	7	3.70	0.53	0.03	6.82	0.97	0.06	0.63	7.45
Align	-	-	-	-	-	-	-	-	-
Calibrate	1	1.30	1.30	0.01	1.28	1.28	0.01	0.00	1.28
Install	1	0.20	0.20	0.00	0.20	0.20	0.00	0.00	0.20
Remove/Replace	11	17.20	1.56	0.15	22.59	2.05	0.20	0.04	22.59
Repair	2	3.40	1.70	0.03	5.39	2.69	0.05	0.02	5.41
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	1	1.40	1.40	0.01	3.32	3.32	0.03	0.00	3.32
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/ Assemble	-	-	-	-	-	-	-	-	-
Remove	2	0.20	0.10	0.00	0.14	0.07	0.00	0.00	0.14
Modification Work Order	-	-	-	-	-	-	-	-	-
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Totals	35	28.50	0.81*	0.25	41.93	1.20*	0.37	0.90	42.83

*Weighted Average, **Maintenance Man-Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED ON BOEING AIRCRAFT V56 FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE DURING DT II BASED ON 114.3 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			** MMHI	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Inspect	10	3.80	0.38	0.03	5.10	0.51	0.04	0.21	5.31
Test	-	-	-	-	-	-	-	-	-
Service	2	0.30	0.15	0.00	0.44	0.22	0.00	0.00	0.44
Adjust	7	3.70	0.53	0.03	6.82	0.98	0.06	0.63	7.45
Align	-	-	-	-	-	-	-	-	-
Calibrate	1	1.30	1.30	0.01	1.28	1.28	0.01	0.00	1.28
Install	1	0.20	0.20	0.00	0.20	0.20	0.00	0.00	0.20
Remove/Replace	11	17.20	1.56	0.15	22.59	2.05	0.20	0.04	22.63
Repair	2	3.40	1.70	0.03	5.39	2.70	0.05	0.02	5.41
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	1	1.40	1.40	0.01	3.32	3.32	0.03	0.00	3.32
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/ Assemble	-	-	-	-	-	-	-	-	-
Remove	2	0.20	0.10	0.00	0.14	0.07	0.00	0.00	0.14
Modification Work Order	4	0.70	0.18	0.01	0.71	0.18	0.01	62.08	62.79
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Totals	41	32.20	0.78*	0.28	45.99	1.12*	0.40	62.98	108.97

*Weighted Average, **Maintenance Man-Hours Indirect

SCHEDULED MAINTENANCE ON BOEING AIRCRAFT V57 FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE DURING DT-II BASED ON 196.8 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Inspect	2	5.00	2.50	0.02	5.89	2.94	0.03	0.00	5.89
Test	-	-	-	-	-	-	-	-	-
Service	-	-	-	-	-	-	-	-	-
Adjust	-	-	-	-	-	-	-	-	-
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	-	-	-	-	-	-	-	-	-
Remove/Replace	-	-	-	-	-	-	-	-	-
Repair	-	-	-	-	-	-	-	-	-
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	-	-	-	-	-	-	-	-	-
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/ Assemble	-	-	-	-	-	-	-	-	-
Remove	-	-	-	-	-	-	-	-	-
Modification Work Order	10	6.90	0.69	0.04	12.44	1.24	0.06	80.62	93.06
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Totals	12	11.90	0.99*	0.06	13.33	1.11*	0.07	80.62	93.95

*Weighted Average, **Maintenance Man-Hours Indirect

UNSCHEDULED MAINTENANCE ON BOEING AIRCRAFT V57 FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE DURING DT-II BASED ON 196.8 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Inspect	2	4.80	2.40	0.02	7.95	3.97	0.04	0.00	7.95
Test	2	0.00	0.00	0.00	0.04	0.02	0.00	0.00	0.04
Service	11	3.80	0.34	0.02	7.47	0.68	0.04	0.05	7.52
Adjust	9	3.50	0.39	0.02	4.11	0.46	0.02	0.24	4.35
Align	1	0.20	0.20	0.00	0.18	0.18	0.00	0.00	0.18
Calibrate	-	-	-	-	-	-	-	-	-
Install	3	1.80	0.60	0.01	1.79	0.60	0.01	0.00	1.79
Remove/Replace	18	75.50	4.19	0.38	158.57	8.81	0.81	3.45	162.02
Repair	11	38.30	3.48	0.19	53.48	4.87	0.27	0.15	53.63
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	1	1.50	1.50	0.01	3.02	3.02	0.02	0.02	3.04
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/ Assemble	2	3.80	1.90	0.02	6.47	3.24	0.03	1.03	7.50
Remove	-	-	-	-	-	-	-	-	-
Modification Work Order	-	-	-	-	-	-	-	-	-
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	-	-	-	-	-	-	-	-	-
Other	4	1.40	0.35	0.07	1.59	0.40	0.01	0.00	1.59
Totals	64	134.60	2.10*	0.68	244.67	3.82*	1.24	4.94	249.61

*Weighted Average, **Maintenance Man-Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED ON BOEING AIRCRAFT V57
FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE DURING DT-II BASED ON 196.8 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Inspect	4	9.80	2.45	0.05	13.84	3.46	0.07	0.00	13.84
Test	2	0.00	0.00	0.00	0.04	0.02	0.00	0.00	0.04
Service	11	3.80	0.34	0.02	7.47	0.68	0.04	0.05	7.52
Adjust	9	3.50	0.39	0.02	4.11	0.46	0.02	0.24	4.35
Align	1	0.20	0.20	0.00	0.18	0.18	0.00	0.00	0.18
Calibrate	-	-	-	-	-	-	-	-	-
Install	3	1.80	0.60	0.01	1.79	0.60	0.01	0.00	1.79
Remove/Replace	18	75.50	4.19	0.38	158.57	8.81	0.81	3.45	152.02
Repair	11	38.30	3.48	0.19	53.48	4.86	0.27	0.15	53.63
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	1	1.50	1.50	0.01	3.02	3.02	0.02	0.02	3.04
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/ Assemble	2	3.80	1.90	0.02	6.47	3.24	0.03	1.03	7.50
Remove	-	-	-	-	-	-	-	-	-
Modification Work Order	10	6.90	0.69	0.04	12.44	1.24	0.06	80.62	93.06
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	-	-	-	-	-	-	-	-	-
Other	4	1.40	0.35	0.01	1.59	0.40	0.01	0.00	1.59
Totals	76	146.50	1.93*	0.74	263.00	3.46*	1.34	85.56	348.56

*Weighted Average, **Maintenance Man-Hours Indirect

SCHEDULED MAINTENANCE ON BOTH BOEING AIRCRAFT V56 AND V57 FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE DURING DT-II BASED ON 311.1 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Inspect	4	8.00	2.00	0.03	9.24	2.31	0.03	0.00	9.24
Test	-	-	-	-	-	-	-	-	-
Service	-	-	-	-	-	-	-	-	-
Adjust	-	-	-	-	-	-	-	-	-
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	-	-	-	-	-	-	-	-	-
Remove/Replace	-	-	-	-	-	-	-	-	-
Repair	-	-	-	-	-	-	-	-	-
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	-	-	-	-	-	-	-	-	-
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/ Assemble	-	-	-	-	-	-	-	-	-
Remove	-	-	-	-	-	-	-	-	-
Modification Work Order	14	7.60	0.54	0.02	13.15	0.94	0.04	142.70	155.85
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Totals	18	15.60	0.87*	0.05	22.39	1.24*	0.07	142.70	165.09

*Weighted Average, **Maintenance Man-Hours Indirect

UNSCHEDULED MAINTENANCE ON BOTH BOEING AIRCRAFT V56 AND V57 FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE DURING DT-II BASED ON 311.1 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Inspect	10	5.60	0.56	0.02	9.70	0.97	0.03	0.21	9.91
Test	2	0.00	0.30	0.00	0.04	0.02	0.00	0.00	0.04
Service	13	4.10	0.32	0.01	7.91	0.61	0.02	0.05	7.96
Adjust	16	7.20	0.45	0.02	10.93	0.68	0.04	0.87	11.80
Align	1	0.20	0.20	0.00	0.18	0.18	0.00	0.00	0.18
Calibrate	1	1.30	1.30	0.00	1.28	1.28	0.00	0.00	1.28
Install	4	2.00	0.50	0.01	1.99	0.50	0.01	0.00	1.99
Remove/Replace	29	92.70	3.20	0.30	181.16	6.25	0.58	3.49	184.65
Repair	13	41.70	3.21	0.13	58.87	4.53	0.19	0.17	59.04
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	2	2.90	1.45	0.01	6.34	3.17	0.02	0.02	6.36
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/ Assemble	2	3.80	1.90	0.01	6.47	3.24	0.02	1.03	7.50
Remove	2	0.20	0.10	0.00	0.14	0.07	0.00	0.00	0.14
Modification Work Order	-	-	-	-	-	-	-	-	-
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	-	-	-	-	-	-	-	-	-
Other	4	1.40	0.35	0.01	1.59	0.40	0.01	0.00	1.59
Totals	99	163.10	1.65*	0.52	286.60	2.89*	0.92	5.84	292.44

*Weighted Average, **Maintenance Man-Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED ON BOTH BOEING AIRCRAFT V56 AND V57
FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE DURING DT-II BASED ON 311.1 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			** MMHI	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Inspect	14	13.60	0.97	0.04	18.94	1.35	0.06	0.21	19.15
Test	2	0.00	0.00	0.00	0.04	0.02	0.00	0.00	0.04
Service	13	4.10	0.31	0.01	7.91	0.61	0.02	0.05	7.96
Adjust	16	7.20	0.45	0.02	10.93	0.68	0.03	0.87	11.80
Align	1	0.20	0.20	0.00	0.18	0.18	0.00	0.00	0.18
Calibrate	1	1.30	1.30	0.00	1.28	1.28	0.00	0.00	1.28
Install	4	2.00	0.50	0.01	1.99	0.50	0.01	0.00	1.99
Remove/Replace	29	92.70	3.20	0.30	181.16	6.25	0.58	3.49	184.65
Repair	13	41.70	3.21	0.13	58.87	4.53	0.19	0.17	59.04
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	2	2.90	1.45	0.01	6.34	3.17	0.02	0.02	6.36
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/ Assemble	2	3.80	1.90	0.01	6.47	3.24	0.02	1.03	7.50
Remove	2	0.20	0.10	0.00	0.14	0.07	0.00	0.00	0.14
Modification Work Order	14	7.60	0.54	0.02	13.15	0.94	0.04	142.70	155.85
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	-	-	-	-	-	-	-	-	-
Other	4	1.40	0.35	0.01	1.59	0.40	0.01	0.00	1.59
Totals	117	178.70	1.53 *	0.57	308.99	2.64 *	0.99	148.54	457.53

*Weighted Average, **Maintenance Man-Hours Indirect

APPENDIX 16

SCHEDULED AND UNSCHEDULED MAINTENANCE OF THE BOEING UTTAS DURING OT II CATEGORIZED BY SUBSYSTEM

SCHEDULED MAINTENANCE ON BOTH BOEING AIRCRAFT V56 AND V57
DURING OT-II BASED ON 199.9 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Airframe	-	-	-	-	-	-	-	-	-
Landing Gear	-	-	-	-	-	-	-	-	-
Power Plant and Pneumatic System	-	-	-	-	-	-	-	-	-
Drive System	3	0.20	0.07	0.00	0.20	0.07	0.00	0.08	0.28
Hydraulic	-	-	-	-	-	-	-	-	-
Instrumentation	-	-	-	-	-	-	-	-	-
Electrical	-	-	-	-	-	-	-	-	-
Fuel	-	-	-	-	-	-	-	-	-
Flight Controls	-	-	-	-	-	-	-	-	-
Utility	-	-	-	-	-	-	-	-	-
Cargo and Personnel Handling Equipment	-	-	-	-	-	-	-	-	-
Auxiliary Power Unit (APU)	-	-	-	-	-	-	-	-	-
Avionics	-	-	-	-	-	-	-	-	-
Armament	-	-	-	-	-	-	-	-	-
Unspecified	161	75.90	0.47	0.38	144.62	0.90	0.72	9.72	154.34
TOTALS	164	76.10	0.46*	0.38	144.82	0.88*	0.72	9.80	154.62

*Weighted Average
**Maintenance Man-Hours Average

UNSCHEDULED MAINTENANCE ON BOTH BOEING AIRCRAFT V56 AND V57
DURING OT-II BASED ON 199.9 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			** MMHI	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	29	1[illegible].40	0.60	0.09	18.93	0.65	0.10	0.20	19.13
Landing Gear	6	2.30	0.38	0.01	2.35	0.39	0.01	0.00	2.35
Power Plant and Pneumatic System	13	2.80	0.22	0.01	2.72	0.21	0.01	0.00	2.72
Drive System	117	33.30	0.28	0.17	50.91	0.44	0.26	8.44	59.35
Hydraulic	28	21.00	0.75	0.10	41.67	1.49	0.21	0.02	41.69
Instrumentation	9	7.30	0.81	0.04	11.33	1.26	0.06	0.00	11.33
Electrical	12	10.30	0.86	0.05	19.50	1.62	0.10	0.00	19.50
Fuel	2	1.50	0.75	0.01	1.56	0.78	0.01	0.00	1.56
Flight Controls	4	3.50	0.88	0.02	6.75	1.69	0.03	0.02	6.77
Utility	-	-	-	-	-	-	-	-	-
Cargo and Personnel Handling Equipment	1	0.10	0.10	0.00	0.12	0.12	0.00	0.00	0.12
Auxiliary Power Unit (APU)	8	8.20	1.02	0.04	10.05	1.26	0.05	0.36	10.41
Avionics	12	3.70	0.31	0.02	4.18	0.35	0.02	0.00	4.18
Armament	-	-	-	-	-	-	-	-	-
Unspecified	12	7.20	0.60	0.04	17.08	1.42	0.08	4.99	22.07
TOTALS	253	118.60	0.47*	0.59	187.15	0.74*	0.94	14.03	201.18

*Weighted Average
**Maintenance Man-Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED ON BOTH BOEING AIRCRAFT V56 AND V57
DURING OT-II BASED ON 199.9 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			** MMHI	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	29	17.40	0.60	0.09	18.93	0.65	0.10	0.20	19.13
Landing Gear	6	2.30	0.38	0.01	2.35	0.39	0.01	0.00	2.35
Power Plant and Pneumatic System	13	2.80	0.22	0.01	2.72	0.21	0.01	0.00	2.72
Drive System	120	33.50	0.28	0.17	51.11	0.43	0.26	8.52	59.63
Hydraulic	28	21.00	0.75	0.10	41.67	1.49	0.21	0.02	41.69
Instrumentation	9	7.30	0.81	0.04	11.33	1.26	0.06	0.00	11.33
Electrical	12	10.30	0.86	0.05	19.50	1.62	0.10	0.00	19.50
Fuel	2	1.50	0.75	0.01	1.56	0.78	0.01	0.00	1.56
Flight Controls	4	3.50	0.88	0.02	6.75	1.69	0.03	0.02	6.77
Utility	-	-	-	-	-	-	-	-	-
Cargo and Personnel Handling Equipment	1	0.10	0.10	0.00	0.12	0.12	0.00	0.00	0.12
Auxiliary Power Unit (APU)	8	8.20	1.02	0.04	10.05	1.26	0.05	0.36	10.41
Avionics	12	3.70	0.31	0.02	4.18	0.35	0.02	0.00	4.18
Armament	-	-	-	-	-	-	-	-	-
Unspecified	173	83.10	0.48	0.42	161.70	0.94	0.81	14.71	176.41
TOTALS	417	194.70	0.47*	0.97	331.97	0.80*	1.66	23.83	355.80

SCHEDULED MAINTENANCE ON BOTH BOEING AIRCRAFT V56 AND V57 FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE DURING OT-II BASED ON 199.9 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			** MMHI	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	-	-	-	-	-	-	-	-	-
Landing Gear	-	-	-	-	-	-	-	-	-
Power Plant and Pneumatic System	-	-	-	-	-	-	-	-	-
Drive System	-	-	-	-	-	-	-	-	-
Hydraulic	-	-	-	-	-	-	-	-	-
Instrumentation	-	-	-	-	-	-	-	-	-
Electrical	-	-	-	-	-	-	-	-	-
Fuel	-	-	-	-	-	-	-	-	-
Flight Controls	-	-	-	-	-	-	-	-	-
Utility	-	-	-	-	-	-	-	-	-
Cargo and Personnel Handling Equipment	-	-	-	-	-	-	-	-	-
Auxiliary Power Unit (APU)	-	-	-	-	-	-	-	-	-
Avionics	-	-	-	-	-	-	-	-	-
Armament	-	-	-	-	-	-	-	-	-
Unspecified	2	3.60	1.80	0.02	8.04	4.02	0.04	1.73	9.77
TOTALS	2	3.60	1.80*	0.02	8.04	4.02*	0.04	1.73	9.77

*Weighted Average
**Maintenance Man-Hours Indirect

UNSCHEDULED MAINTENANCE ON BOTH BOEING AIRCRAFT V56 NAD V57 FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE DURING OT-II BASED ON 199.9 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	6	9.90	1.65	0.05	11.25	1.88	0.06	0.10	11.35
Landing Gear	4	2.10	0.52	0.01	2.18	0.54	0.01	0.00	[illegible].18
Power Plant and Pneumatic System	4	2.00	0.50	0.01	1.95	0.49	0.01	0.00	1.95
Drive System	25	25.80	1.03	0.13	43.28	1.73	0.22	8.11	51.39
Hydraulic	6	19.10	3.18	0.10	39.17	6.53	0.20	0.02	39.19
Instrumentation	2	3.30	1.65	0.02	5.75	2.88	0.03	0.00	5.75
Electrical	1	7.90	7.90	0.04	17.17	17.17	0.09	0.00	17.17
Fuel	1	1.50	1.50	0.01	1.53	1.53	0.01	0.00	1.53
Flight Controls	1	0.70	0.70	0.00	0.70	0.70	0.00	0.00	0.70
Utility	-	-	-	-	-	-	-	-	-
Cargo and Personnel Handling Equipment	-	-	-	-	-	-	-	-	-
Auxiliary Power Unit (APU)	2	4.80	2.40	0.02	5.84	2.92	0.03	0.36	6.20
Avionics	-	-	-	-	-	-	-	-	-
Armament	-	-	-	-	-	-	-	-	-
Unspecified	3	4.50	1.50	0.02	7.94	2.65	0.04	4.99	12.93
TOTALS	55	81.60	1.48*	0.41	136.76	2.49*	0.69	13.58	150.34

*Weighted Average
**Maintenance Man-Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED ON BOTH BOEING AIRCRAFT V56 AND V57 FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE DURING OT-II BASED ON 199.9 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	** MMHI	MMHD plus MMHI
Airframe	5	9.90	1.65	0.05	11.25	1.88	0.06	0.10	11.35
Landing Gear	4	2.10	0.52	0.01	2.18	0.54	0.01	0.00	2.18
Power Plant and Pneumatic System	4	2.00	0.50	0.01	1.95	0.49	0.01	0.00	1.95
Drive System	25	25.80	1.03	0.13	43.28	1.73	0.22	8.11	51.39
Hydraulic	6	19.10	3.18	0.10	39.17	6.53	0.20	0.02	39.19
Instrumentation	2	3.30	1.65	0.02	5.75	2.88	0.03	0.00	5.75
Electrical	1	7.90	7.90	0.04	17.17	17.17	0.09	0.00	17.17
Fuel	1	1.50	1.50	0.01	1.53	1.53	0.01	0.00	1.53
Flight Controls	1	0.70	0.70	0.00	0.70	0.70	0.00	0.00	0.70
Utility	-	-	-	-	-	-	-	-	-
Cargo and Personnel Handling Equipment	-	-	-	-	-	-	-	-	-
Auxiliary Power Unit (APU)	2	4.80	2.40	0.02	5.84	2.92	0.03	0.36	6.20
Avionics	-	-	-	-	-	-	-	-	-
Armament	-	-	-	-	-	-	-	-	-
Unspecified	5	8.10	1.62	0.04	15.98	3.20	0.08	6.72	22.70
TOTALS	57	85.20	1.50*	0.43	144.80	2.54*	0.72	15.31	160.11

*Weighted Average
**Maintenance Man-Hours Indirect

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APPENDIX 17

SCHEDULED AND UNSCHEDULED MAINTENANCE OF THE BOEING UTTAS DURING OT II CATEGORIZED BY MAINTENANCE FUNCTION

SCHEDULED MAINTENANCE ON BOTH BOEING AIRCRAFT V56 AND V57 DURING OT-II BASED ON 199.9 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	
Inspect	160	71.70	0.45	0.36	132.44	0.83	0.66	7.84	140.28
Test	-	-	-	-	-	-	-	-	-
Service	1	0.70	0.70	0.00	0.92	0.92	0.00	0.00	0.92
Adjust	-	-	-	-	-	-	-	-	-
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	-	-	-	-	-	-	-	-	-
Remove/Replace	-	-	-	-	-	-	-	-	-
Repair	-	-	-	-	-	-	-	-	-
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	5	1.80	0.36	0.01	2.96	0.59	0.02	0.00	2.96
Fault Location	-	-	-	-	-	-	-	-	-
Operation	-	-	-	-	-	-	-	-	-
Lubricate	1	0.20	0.20	0.00	0.20	0.20	0.00	0.00	0.20
Disassemble/ Assemble	-	-	-	-	-	-	-	-	-
Remove	-	-	-	-	-	-	-	-	-
Modification Work Order	4	7.80	1.95	0.04	8.94	2.24	0.04	2.10	11.04
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	-	-	-	-	-	-	-	-	-
Other	2	3.50	1.75	0.02	11.26	5.63	0.06	1.96	13.22
Totals	173	85.70	0.50*	0.43	156.72	0.91*	0.73	11.90	168.62

*Weighted Average, **Maintenance Man-Hours Indirect

UNSCHEDULED MAINTENANCE ON BOTH BOEING AIRCRAFT Y56 AND Y57 DURING OT-II BASED ON 199.9 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Inspect	13	2.90	0.22	0.02	3.38	0.26	0.02	11.84	15.22
Test	5	0.20	0.04	0.00	0.14	0.02	0.00	0.87	1.01
Service	111	6.20	0.06	0.03	6.90	0.06	0.04	0.00	6.90
Adjust	17	2.70	0.16	0.01	4.00	0.24	0.02	0.02	4.02
Align	-	-	-	-	-	-	-	-	-
Calibrate	1	0.10	0.10	0.00	0.07	0.07	0.00	0.00	0.07
Install	7	0.80	0.11	0.00	0.78	0.11	0.00	0.00	0.78
Remove/Replace	57	68.80	1.21	0.34	105.89	1.86	0.53	1.03	106.92
Repair	33	29.70	0.90	0.15	47.45	1.44	0.24	0.17	47.62
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	1	2.70	2.70	0.01	5.90	5.90	0.03	0.00	5.90
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/Assemble	2	0.80	0.40	0.00	1.86	0.93	0.01	0.10	1.96
Remove	1	0.50	0.50	0.00	0.83	0.83	0.00	0.00	0.83
Modification Work Order	1	0.80	0.80	0.00	4.28	4.28	0.02	0.00	4.28
Cannibalize	1	1.00	1.00	0.00	1.47	1.47	0.01	0.00	1.47
Safety Wire	1	0.10	0.10	0.00	0.07	0.07	0.00	0.00	0.07
Other	3	2.10	0.70	0.01	8.41	2.80	0.04	0.00	8.41
Totals	254	119.40	0.47*	0.60	191.43	0.75*	0.96	14.03	205.46

*Weighted Average, **Maintenance Man-Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED ON BOTH BOEING AIRCRAFT V56 AND V57 DURING OT-II BASED ON 199.9 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM): ACM	ACM Per Event	ACM Per Flight Hour	Maintenance Man Hours Direct (MMHD): MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Inspect	173	74.60	0.43	0.37	135.82	0.78	0.68	19.68	155.50
Test	5	0.20	0.04	0.00	0.14	0.03	0.00	0.87	1.01
Service	112	6.90	0.06	0.04	7.82	0.07	0.04	0.00	7.82
Adjust	17	2.70	0.16	0.01	4.00	0.24	0.02	0.02	4.02
Align	-	-	-	-	-	-	-	-	-
Calibrate	1	0.10	0.10	0.00	0.07	0.07	0.00	0.00	0.07
Install	7	0.80	0.11	0.00	0.78	0.11	0.00	0.00	0.78
Remove/Replace	57	68.80	1.21	0.34	105.89	1.86	0.53	1.03	106.92
Repair	33	29.70	0.90	0.15	47.45	1.44	0.24	0.17	47.62
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	5	1.80	0.36	0.01	2.96	0.59	0.02	0.00	2.96
Fault Location	1	2.70	2.70	0.01	5.90	5.90	0.03	0.00	5.90
Operation	-	-	-	-	-	-	-	-	-
Lubricate	1	0.20	0.20	0.00	0.20	0.20	0.00	0.00	0.20
Disassemble/Assemble	2	0.80	0.40	0.00	1.86	0.93	0.01	0.10	1.96
Remove	1	0.50	0.50	0.00	0.83	0.83	0.00	0.00	0.83
Modification Work Order	5	8.60	1.72	0.04	13.22	2.64	0.07	2.10	15.32
Cannibalize	1	1.00	1.00	0.00	1.47	1.47	0.01	0.00	1.47
Safety Wire	1	0.10	0.10	0.00	0.07	0.07	0.00	0.00	0.07
Other	5	5.60	1.12	0.03	19.67	3.93	0.10	1.96	21.63
Totals	427	205.01	0.48*	1.03	348.15	0.82*	1.74	25.93	374.08

*Weighted Average, **Maintenance Man-Hours Indirect

SCHEDULED MAINTENANCE ON BOTH BOEING AIRCRAFT V56 AND V57 FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE DURING OT-II BASED ON 199.9 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	** MMHI	MMHD plus MMHI
Inspect	1	1.80	1.80	0.01	1.85	1.85	0.01	0.00	1.85
Test	-	-	-	-	-	-	-	-	-
Service	-	-	-	-	-	-	-	-	-
Adjust	-	-	-	-	-	-	-	-	-
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	-	-	-	-	-	-	-	-	-
Remove/Replace	-	-	-	-	-	-	-	-	-
Repair	-	-	-	-	-	-	-	-	-
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	-	-	-	-	-	-	-	-	-
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/ Assemble	-	-	-	-		-	-	-	-
Remove	-	-	-	-	-	-	-	-	-
Modification Work Order	3	7.80	2.60	0.04	8.94	2.98	0.04	1.30	10.24
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	-	-	-	-	-	-	-	-	-
Other	1	1.80	1.80	0.01	6.19	6.19	0.03	1.73	7.92
Totals	5	11.40	2.28*	0.06	16.98	3.40*	0.08	3.03	20.01

*Weighted Average, **Maintenance Man-Hours Indirect

UNSCHEDULED MAINTENANCE ON BOTH BOEING AIRCRAFT V56 AND V57 FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE DURING OT-II BASED ON 199.9 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Inspect	4	0.90	0.22	0.00	0.92	0.23	0.60	11.51	12.43
Test	1	0.00	0.00	0.00	0.00	0.00	0.00	0.87	0.87
Service	5	0.10	0.02	0.00	0.26	0.05	0.00	0.00	0.26
Adjust	4	1.20	0.30	0.01	2.60	0.65	0.01	0.00	2.60
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	1	0.20	0.20	0.00	0.20	0.20	0.00	0.00	0.20
Remove/Replace	24	57.20	2.38	0.29	92.73	3.86	0.46	1.03	93.76
Repair	12	19.70	1.64	0.10	35.89	2.99	0.18	0.07	35.96
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	-	-	-	-	-	-	-	-	-
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/ Assemble	2	0.80	0.40	0.00	1.86	0.93	0.01	0.10	1.96
Remove	1	0.50	0.50	0.00	0.83	0.83	0.00	0.00	0.83
Modification Work Order	-	-	-	-	-	-	-	-	-
Cannibalize	1	1.00	1.00	0.00	1.47	1.47	0.01	0.00	1.47
Safety Wire	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Totals	55	81.60	1.48*	0.41	136.76	2.49*	0.68	13.58	150.34

*Weighted Average, **Maintenance Man-Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED ON BOTH BOEING AIRCRAFT V56 AND V57 FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE DURING QT-II BASED ON 199.9 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Inspect	5	2.70	0.54	0.01	2.77	0.55	0.01	11.51	14.28
Test	1	0.00	0.00	0.00	0.00	0.00	0.00	0.87	0.87
Service	5	0.10	0.02	0.00	0.26	0.05	0.00	0.00	0.26
Adjust	4	1.20	0.30	0.01	2.60	0.65	0.01	0.00	2.60
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	1	0.20	0.20	0.00	0.20	0.20	0.00	0.00	0.20
Remove/Replace	24	57.20	2.38	0.29	92.73	3.86	0.46	1.03	93.76
Repair	12	19.70	1.64	0.10	35.89	2.99	0.18	0.07	35.96
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	-	-	-	-	-	-	-	-	-
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/ Assemble	2	0.80	0.40	0.00	1.86	0.93	0.01	0.10	1.96
Remove	1	0.50	0.50	0.00	0.83	0.83	0.00	0.00	0.83
Modification Work Order	3	7.80	2.60	0.04	8.94	2.98	0.04	1.30	10.24
Cannibalize	1	1.00	1.00	0.00	1.47	1.47	0.01	0.00	1.47
Safety Wire	-	-	-	-	-	-	-	-	-
Other	1	1.80	1.80	0.01	6.19	6.19	0.03	1.73	7.92
Totals	69	93.00	1.55*	0.46	153.74	2.56*	0.77	16.61	170.35

*Weighted Average, **Maintenance Man-Hours Indirect

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APPENDIX 18

SCHEDULED AND UNSCHEDULED MAINTENANCE OF THE SIKORSKY UTTAS DURING DT II CATEGORIZED BY SUBSYSTEM

SCHEDULED MAINTENANCE ON SIKORSKY AIRCRAFT S50 DURING DT II
BASED ON 110.3 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			** MMHI	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	1	0.10	0.10	0.00	0.12	0.12	0.00	0.00	0.12
Landing Gear	1	0.90	0.90	0.01	1.01	1.01	0.00	0.10	1.11
Power Plant	3	0.70	0.23	0.01	0.62	0.21	0.01	0.13	0.75
Drive System	38	6.60	0.17	0.06	7.40	0.20	0.00	3.16	10.56
Hydraulic	—	—	—	—	—	—	—	—	—
Instrumentation	—	—	—	—	—	—	—	—	—
Electrical	—	—	—	—	—	—	—	—	—
Fuel	—	—	—	—	—	—	—	—	—
Flight Controls	1	0.00	—	—	0.00	—	—	0.00	0.00
Utility	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	—	—	—	—	—	—	—	—	—
Auxiliary Power Unit (APU)	—	—	—	—	—	—	—	—	—
Avionics	—	—	—	—	—	—	—	—	—
Armament	—	—	—	—	—	—	—	—	—
Unspecified	164	81.60	0.50	0.74	125.73	0.77	1.14	0.38	126.11
TOTALS	208	89.90	0.43*	0.82	134.88	0.65*	1.22	3.77	138.65

*Weighted Average
**Maintenance Man Hours Indirect

UNSCHEDULED MAINTENANCE ON SIKORSKY AIRCRAFT S50 DURING DT II
BASED ON 110.3 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			** MMHI	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	19	6.20	0.33	0.06	9.31	0.49	0.08	0.61	9.92
Landing Gear	12	11.00	0.92	0.01	14.92	1.24	0.14	0.32	15.24
Power Plant	17	8.90	0.52	0.08	11.46	0.67	0.10	0.40	11.86
Drive System	25	24.90	1.00	0.23	41.53	1.66	0.38	0.32	41.85
Hydraulic	22	12.80	0.58	0.12	18.73	0.85	0.17	0.32	19.05
Instrumentation	7	0.70	0.10	0.01	0.96	0.14	0.01	0.00	0.96
Electrical	20	0.87	0.44	0.08	12.67	0.63	0.12	0.07	12.74
Fuel	11	5.60	0.51	0.05	6.42	0.58	0.06	0.16	6.58
Flight Controls	16	16.90	1.06	0.15	22.66	1.42	0.21	1.04	23.70
Utility	3	0.20	0.07	0.00	0.25	0.08	0.00	0.00	0.25
Cargo and Personnel Handling Equipment	4	0.60	0.15	0.01	0.74	0.19	0.01	0.00	0.74
Auxiliary Power Unit (APU)	—	—	—	—	—	—	—	—	—
Avionics	17	9.50	0.56	0.09	15.45	0.91	0.14	0.15	15.60
Armament	—	—	—	—	—	—	—	—	—
Unspecified	3	0.60	0.20	0.01	0.70	0.23	0.01	0.00	0.70
TOTALS	176	106.60	0.60*	0.97	155.80	0.89*	1.41	3.39	159.19

*Weighted Average
**Maintenance Man Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED ON SIKORSKY AIRCRAFT S50 DURING DT II
BASED ON 110.3 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM) ACM	ACM Per Event	ACM Per Flight Hour	Maintenance Man Hours Direct (MMHD) MMHD	MMHD Per Event	MMHD Per Flight Hour	** MMHI	MMHD plus MMHI
Airframe	20	6.30	0.32	0.06	9.43	0.47	0.09	0.61	10.04
Landing Gear	13	11.90	0.92	0.11	15.93	1.23	0.14	0.42	16.35
Power Plant	20	9.60	0.48	0.09	12.08	0.60	0.11	0.53	12.61
Drive System	63	31.50	0.50	0.29	48.93	0.78	0.44	3.48	52.41
Hydraulic	22	12.80	0.58	0.12	18.73	0.85	0.17	0.32	19.05
Instrumentation	7	0.70	0.10	0.01	0.96	0.14	0.01	0.00	0.96
Electrical	20	0.87	0.44	0.08	12.67	0.63	0.12	0.07	12.74
Fuel	11	5.60	0.51	0.05	6.42	0.58	0.06	0.16	6.58
Flight Controls	17	16.90	0.99	0.15	22.66	1.33	0.21	1.04	23.70
Utility	3	0.20	0.07	0.00	0.25	0.08	0.00	0.00	0.25
Cargo and Personnel Handling Equipment	4	0.60	0.15	0.01	0.74	0.19	0.01	0.00	0.74
Auxiliary Power Unit (APU)	—	—	—	—	—	—	—	—	—
Avionics	17	9.50	0.56	0.09	15.45	0.91	0.14	0.15	15.60
Armament	—	—	—	—	—	—	—	—	—
Unspecified	167	82.20	0.49	0.75	126.43	0.76	1.15	0.3[illegible]	126.71
TOTALS	384	196.50	0.51*	1.78	290.68	0.76*	2.64	7.16	297.74

*Weighted Average
**Maintenance Man Hours Indirect

SCHEDULED MAINTENANCE ON SIKORSKY AIRCRAFT 852 DURING DT II
BASED ON 194.3 FLIGHT HOURS

		Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
Subsystem	Number of Events	ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	** MMHI	MMHD plus MMHI
Airframe	—	—	—	—	—	—	—	—	—
Landing Gear	1	1.40	1.40	0.01	2.22	2.20	0.01	2.20	4.42
Power Plant	3	0.70	0.23	0.00	0.74	0.25	0.00	0.15	0.89
Drive System	48	14.30	0.30	0.07	17.91	0.37	0.09	2.94	20.85
Hydraulic	1	0.30	0.30	0.00	0.27	0.27	0.00	0.00	0.27
Instrumentation	—	—	—	—	—	—	—	—	—
Electrical	—	—	—	—	—	—	—	—	—
Fuel	—	—	—	—	—	—	—	—	—
Flight Controls	—	—	—	—	—	—	—	—	—
Utility	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	—	—	—	—	—	—	—	—	—
Auxiliary Power Unit (APU)	—	—	—	—	—	—	—	—	—
Avionics	—	—	—	—	—	—	—	—	—
Armament	—	—	—	—	—	—	—	—	—
Unspecified	235	120.30	0.51	0.62	184.20	0.78	0.95	0.26	184.46
TOTALS	288	137.00	0.48*	0.71	205.42	0.72*	1.06	5.55	210.89

*Weighted Average
**Maintenance Man Hours Indirect

UNSCHEDULED MAINTENANCE ON SIKORSKY AIRCRAFT S52 DURING DT II
BASED ON 194.3 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			** MMHI	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	32	17.10	0.53	0.09	26.17	0.82	0.14	0.27	26.44
Landing Gear	16	5.20	0.33	0.03	5.59	0.35	0.03	0.03	5.62
Power Plant	30	23.60	0.79	0.12	33.84	1.69	0.17	0.90	34.74
Drive System	30	19.60	0.65	0.10	28.37	0.95	0.15	1.64	30.01
Hydraulic	24	13.30	0.55	0.07	20.14	0.84	0.10	0.99	21.13
Instrumentation	11	1.70	0.16	0.01	2.00	0.18	0.01	0.00	2.00
Electrical	22	12.10	0.55	0.06	14.12	0.64	0.07	0.02	14.14
Fuel	12	4.50	0.38	0.02	5.75	0.48	0.03	0.00	5.75
Flight Controls	9	27.70	1.46	0.14	39.97	2.10	0.21	4.17	44.14
Utility	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	9	3.70	0.41	0.02	3.82	0.42	0.02	0.00	3.82
Auxiliary Power Unit (APU)	—	—	—	—	—	—	—	—	—
Avionics	11	7.60	0.69	0.04	13.42	1.22	0.07	2.10	15.52
Armament	—	—	—	—	—	—	—	—	—
Unspecified	7	14.70	2.10	0.08	22.37	3.20	0.12	0.90	23.27
TOTALS	224	150.80	0.67*	0.78	215.56	0.96*	1.11	11.02	226.58

*Weighted Average
**Maintenance Man Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED ON SIKORSKY AIRCRAFT S52 DURING DT II
BASED ON 194.3 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			** MMHI	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	32	17.10	0.53	0.09	26.17	0.82	0.14	0.27	26.44
Landing Gear	17	6.60	0.39	0.03	7.81	0.46	0.04	2.23	10.04
Power Plant	33	11.34	0.34	0.06	34.58	1.05	0.18	1.05	35.63
Drive System	78	33.90	0.44	0.17	46.28	0.59	0.24	4.58	50.86
Hydraulic	25	13.60	0.54	0.07	20.41	0.86	0.11	0.99	21.40
Instrumentation	11	1.70	0.16	0.01	2.00	0.18	0.01	0.00	2.00
Electrical	22	12.10	0.55	0.06	14.12	0.64	0.07	0.00	14.14
Fuel	12	4.50	0.38	0.02	5.75	0.48	0.03	0.00	5.75
Flight Controls	19	27.70	1.16	0.14	39.97	2.10	0.21	4.17	44.14
Utility	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	9	3.70	0.41	0.02	3.82	0.42	0.20	0.00	3.82
Auxiliary Power Unit (APU)	—	—	—	—	—	—	—	—	—
Avionics	11	7.60	0.69	0.04	13.42	1.22	0.07	2.10	15.52
Armament	—	—	—	—	—	—	—	—	—
Unspecified	243	147.96	0.61	0.76	206.55	0.85	1.06	1.18	207.73
TOTALS	512	287.80	0.56*	1.48	420.98	0.82*	2.17	16.57	437.55

*Weighted Average
**Maintenance Man Hours Indirect

SCHEDULED MAINTENANCE ON BOTH SIKORSKY AIRCRAFT S50 AND S52 DURING DT II
BASED ON 304.6 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM) ACM	ACM Per Event	ACM Per Flight Hour	Maintenance Man Hours Direct (MMHD) MMHD	MMHD Per Event	MMHD Per Flight Hour	** MMHI	MMHD plus MMHI
Airframe	1	0.10	0.10	0.00	0.12	0.12	0.00	0.00	0.12
Landing Gear	2	2.30	1.15	0.01	3.23	1.62	0.01	2.30	5.53
Power Plant	6	1.40	0.23	0.00	1.36	0.23	0.00	0.28	1.64
Drive System	86	20.90	0.24	0.07	25.31	0.29	0.08	6.10	31.41
Hydraulic	1	0.30	0.30	0.00	0.27	0.27	0.00	0.00	0.27
Instrumentation	—	—	—	—	—	—	—	—	—
Electrical	—	—	—	—	—	—	—	—	—
Fuel	—	—	—	—	—	—	—	—	—
Flight Controls	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Utility	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	—	—	—	—	—	—	—	—	—
Auxiliary Power Unit (APU)	—	—	—	—	—	—	—	—	—
Avionics	—	—	—	—	—	—	—	—	—
Armament	—	—	—	—	—	—	—	—	—
Unspecified	399	201.90	0.51	0.66	310.01	0.78	1.02	0.64	310.65
TOTALS	496	226.90	0.46 *	0.75	340.30	0.69 *	1.12	9.32	349.62

*Weighted Average
**Maintenance Man Hours Indirect

UNSCHEDULED MAINTENANCE ON BOTH SIKORSKY AIRCRAFT S50 AND S52 DURING DT II
BASED ON 304.6 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI	
Airframe	52	23.50	0.45	0.08	35.65	0.69	0.12	0.88	36.53
Landing Gear	28	16.20	0.58	0.05	20.51	0.73	0.07	0.35	20.86
Power Plant	47	32.50	0.69	0.11	45.30	0.96	0.15	1.30	46.60
Drive System	55	44.50	0.81	0.15	69.90	1.27	0.23	1.96	71.86
Hydraulic	46	26.10	0.57	0.09	38.87	0.85	0.13	1.31	40.18
Instrumentation	18	2.40	0.13	0.01	2.96	0.16	0.01	0.00	2.96
Electrical	42	20.80	0.50	0.07	26.77	0.64	0.09	0.09	26.86
Fuel	23	10.10	0.44	0.03	12.17	0.53	0.04	0.16	12.33
Flight Controls	35	44.60	1.27	0.15	62.63	1.79	0.21	5.21	67.84
Utility	3	0.20	0.07	0.00	0.25	0.08	0.00	0.00	0.25
Cargo and Personnel Handling Equipment	13	4.30	0.33	0.01	4.56	0.35	0.02	0.00	4.56
Auxiliary Power Unit (APU)	—	—	—	—	—	—	—	—	—
Avionics	28	17.10	0.61	0.06	28.87	1.03	0.10	2.25	31.12
Armament	—	—	—	—	—	—	—	—	—
Unspecified	10	14.70	1.47	0.05	22.47	2.25	0.07	0.90	23.37
TOTALS	400	257.40	0.64*	0.85	371.36	0.93*	1.22	14.41	385.77

*Weighted Average
**Maintenance Man Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED ON BOTH SIKORSKY AIRCRAFT S50 AND S52 DURING DT II
BASED ON 304.6 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			** MMHI	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	53	23.60	0.45	0.08	35.77	0.68	0.12	0.88	36.65
Landing Gear	30	18.50	0.62	0.06	23.74	0.79	0.08	2.65	26.39
Power Plant	53	33.90	0.64	0.11	46.66	0.88	0.15	1.58	48.24
Drive System	141	65.40	0.46	0.22	95.21	0.68	0.31	8.06	103.27
Hydraulic	47	26.40	0.56	0.09	39.14	0.83	0.13	1.31	40.45
Instrumentation	18	2.40	0.13	0.01	2.96	0.16	0.01	0.00	2.96
Electrical	42	20.80	0.50	0.07	26.77	0.64	0.09	0.09	26.86
Fuel	23	10.10	0.44	0.03	12.17	0.53	0.04	0.16	12.33
Flight Controls	36	44.60	1.24	0.15	62.63	1.74	0.21	5.21	67.84
Utility	3	0.20	0.07	0.00	0.25	0.08	0.00	0.00	0.25
Cargo and Personnel Handling Equipment	13	4.30	0.33	0.01	4.56	0.35	0.02	0.00	4.56
Auxiliary Power Unit (APU)	—	—	—	—	—	—	—	—	—
Avionics	28	17.10	0.61	0.06	28.87	1.03	0.10	2.25	31.12
Armament	—	—	—	—	—	—	—	—	—
Unspecified	409	217.00	0.53	0.71	332.40	0.81	1.09	1.54	333.94
TOTALS	896	484.30	0.54*	1.59	711.66	0.74*	2.34	23.75	735.39

*Weighted Average
**Maintenance Man Hours Indirect

APPENDIX 19

SCHEDULED AND UNSCHEDULED MAINTENANCE OF THE SIKORSKY UTTAS FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE DURING DT II CATEGORIZED BY SUBSYSTEM

SCHEDULED MAINTENANCE ON SIKORSKY AIRCRAFT S50
FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE DURING DT II
BASED ON 110.3 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	—	—	—	—	—	—	—	—	—
Landing Gear	1	0.90	0.90	0.01	1.01	1.01	0.01	0.10	1.11
Power Plant and Pneumatic System	1	0.40	0.40	0.00	0.39	0.39	0.00	0.80	0.47
Drive System	2	1.50	0.75	0.01	2.44	1.22	0.02	0.10	2.54
Hydraulic	—	—	—	—	—	—	—	—	—
Instrumentation	—	—	—	—	—	—	—	—	—
Electrical	—	—	—	—	—	—	—	—	—
Fuel	—	—	—	—	—	—	—	—	—
Flight Controls	—	—	—	—	—	—	—	—	—
Utility	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	—	—	—	—	—	—	—	—	—
Auxiliary Power Unit (APU)	—	—	—	—	—	—	—	—	—
Avionics	—	—	—	—	—	—	—	—	—
Armament	—	—	—	—	—	—	—	—	—
Unspecified	3	1.60	0.53	0.02	2.30	0.77	0.02	0.00	2.30
TOTALS	7	4.40	0.63 *	0.04	6.14	0.88 *	0.06	0.28	6.42

*Weighted Average
**Maintenance Man Hours Indirect

UNSCHEDULED MAINTENANCE ON SIKORSKY AIRCRAFT S50
FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE DURING DT II
BASED ON 110.3 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI	
Airframe	6	4.40	0.74	0.04	7.45	1.24	0.07	0.49	7.94
Landing Gear	2	0.90	0.45	0.01	1.24	0.62	0.01	0.00	1.24
Power Plant and Pneumatic System	5	5.60	1.12	0.05	7.13	1.43	0.06	0.08	7.21
Drive System	10	21.00	2.10	0.19	36.33	3.63	0.33	0.20	36.53
Hydraulic	13	8.10	0.62	0.07	11.96	0.92	0.11	0.27	12.23
Instrumentation	—	—	—	—	—	—	—	—	—
Electrical	4	1.70	0.43	0.02	1.79	0.45	0.02	0.00	1.79
Fuel	4	5.20	1.30	0.05	5.72	1.43	0.05	0.16	5.88
Flight Controls	8	11.20	1.40	0.10	15.19	1.90	0.14	0.82	16.01
Utility	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	—	—	—	—	—	—	—	—	—
Auxiliary Power Unit (APU)	—	—	—	—	—	—	—	—	—
Avionics	1	1.00	1.00	0.01	1.01	1.01	0.01	0.15	1.16
Armament	—	—	—	—	—	—	—	—	—
Unspecified	1	0.10	0.10	0.00	0.09	0.09	0.00	0.00	0.09
TOTALS	54	59.20	1.10 *	0.54	87.91	1.63 *	0.80	2.17	87.91

*Weighted Average
**Maintenance Man Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED ON SIKORSKY AIRCRAFT S50
FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE DURING DT II
BASED ON 110.3 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			** MMHI	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	6	4.40	0.73	0.04	7.45	1.24	0.68	0.49	7.94
Landing Gear	3	1.80	0.60	0.02	2.25	0.75	0.02	0.10	2.35
Power Plant and Pneumatic System	6	6.00	1.00	0.05	7.52	1.25	0.07	0.16	7.68
Drive System	12	22.50	1.88	0.20	38.77	3.23	0.35	0.30	39.07
Hydraulic	13	8.10	0.62	0.07	11.96	0.92	0.11	0.27	12.23
Instrumentation	—	—	—	—	—	—	—	—	—
Electrical	4	1.70	0.43	0.02	1.79	0.45	0.02	0.00	1.79
Fuel	4	5.20	1.30	0.05	5.72	1.43	0.05	0.16	5.88
Flight Controls	8	11.20	1.40	0.10	15.19	1.90	0.14	0.82	16.01
Utility	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	—	—	—	—	—	—	—	—	—
Auxiliary Power Unit (APU)	—	—	—	—	—	—	—	—	—
Avionics	1	1.00	1.00	0.01	1.01	1.01	0.01	0.15	1.16
Armament	—	—	—	—	—	—	—	—	—
Unspecified	4	1.70	0.43	0.02	2.39	0.60	0.02	1.29	3.68
TOTALS	61	63.60	1.04 *	0.58	94.05	1.54*	0.85	2.45	96.50

*Weighted Average
**Maintenance Man Hours Indirect

SCHEDULED MAINTENANCE ON SIKORSKY AIRCRAFT S52
FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE DURING DT II
BASED ON 194.3 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			** MMHI	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	—	—	—	—	—	—	—	—	—
Landing Gear	1	1.40	1.40	0.01	2.22	2.22	0.01	2.20	4.42
Power Plant and Pneumatic System	2	0.60	0.30	0.00	0.61	0.30	0.60	0.15	0.76
Drive System	4	4.70	1.18	0.02	8.50	2.13	0.04	1.36	9.86
Hydraulic	—	—	—	—	—	—	—	—	—
Instrumentation	—	—	—	—	—	—	—	—	—
Electrical	—	—	—	—	—	—	—	—	—
Fuel	—	—	—	—	—	—	—	—	—
Flight Controls	—	—	—	—	—	—	—	—	—
Utility	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	—	—	—	—	—	—	—	—	—
Auxiliary Power Unit (APU)	—	—	—	—	—	—	—	—	—
Avionics	—	—	—	—	—	—	—	—	—
Armament	—	—	—	—	—	—	—	—	—
Unspecified	3	4.90	1.63	0.03	5.78	1.93	0.03	0.00	5.78
TOTALS	10	11.60	1.16*	0.06	17.11	1.71*	0.09	3.71	20.82

*Weighted Average
**Maintenance Man Hours Indirect

UNSCHEDULED MAINTENANCE ON SIKSORKY AIRCRAFT S52
FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE DURING DT II
BASED ON 194.3 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	** MMHI	MMHD plus MMHI
Airframe	7	4.60	0.66	0.02	7.31	1.04	0.04	0.07	7.38
Landing Gear	1	0.60	0.60	0.00	1.10	1.10	0.01	0.03	1.13
Power Plant and Pneumatic System	12	15.30	1.23	0.08	23.02	1.92	0.12	0.35	23.37
Drive System	13	10.10	0.78	0.05	15.01	1.16	0.08	1.58	16.59
Hydraulic	12	11.40	0.95	0.06	16.88	1.41	0.09	0.96	17.84
Instrumentation	—	—	—	—	—	—	—	—	—
Electrical	2	1.30	0.65	0.01	1.26	0.63	0.01	0.00	1.26
Fuel	2	1.40	0.70	0.01	1.62	0.81	0.01	0.00	1.62
Flight Controls	5	8.00	1.60	0.04	14.04	2.81	0.07	2.95	16.99
Utility	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	1	0.30	0.30	0.00	0.43	0.43	0.00	0.00	0.43
Auxiliary Power Unit (APU)	—	—	—	—	—	—	—	—	—
Avionics	2	0.20	0.10	0.00	0.30	0.15	0.00	0.00	0.30
Armament	—	—	—	—	—	—	—	—	—
Unspecified	1	0.50	0.50	0.00	0.62	0.62	0.00	0.00	0.62
TOTALS	58	53.70	0.93*	0.28	81.59	1.41*	0.42	5.94	87.53

*Weighted Average
**Maintenance Man Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED ON SIKORSKY AIRCRAFT S52
FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE DURING DT II
BASED ON 194.3 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			** MMHI	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	7	4.60	0.66	0.02	7.31	1.04	0.04	0.07	7.38
Landing Gear	2	2.00	1.00	0.01	3.32	1.66	0.02	2.23	5.55
Power Plant and Pneumatic System	14	15.90	1.14	0.08	23.63	1.69	0.12	0.50	24.13
Drive System	17	14.80	0.87	0.08	23.51	1.38	0.12	2.94	26.45
Hydraulic	12	11.40	0.95	0.06	16.88	1.41	0.09	0.96	17.84
Instrumentation	—	—	—	—	—	—	—	—	—
Electrical	2	1.30	0.65	0.01	1.26	0.63	0.01	0.00	1.26
Fuel	2	1.40	0.70	0.01	1.62	0.81	0.01	0.00	1.62
Flight Controls	5	8.00	1.60	0.04	14.04	2.81	0.07	2.95	16.99
Utility	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	1	0.30	0.30	0.00	0.43	0.43	0.00	0.00	0.43
Auxiliary Power Unit (APU)	—	—	—	—	—	—	—	—	—
Avionics	2	0.20	0.10	0.00	0.30	0.15	0.00	0.00	0.30
Armament	—	—	—	—	—	—	—	—	—
Unspecified	4	5.40	1.35	0.03	6.40	1.60	0.03	0.00	6.40
TOTALS	68	65.30	0.96 *	0.34	98.70	1.45 *	0.51	9.65	108.35

*Weighted Average
**Maintenance Man Hours Indirect

SCHEDULED MAINTENANCE ON BOTH SIKORSKY AIRCRAFT S50 AND S52
FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE DURING DT II
BASED ON 304.6 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			** MMHI	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	—	—	—	—	—	—	—	—	—
Landing Gear	—	—	—	—	—	—	—	—	—
Power Plant and Pneumatic System	3	1.00	0.33	0.00	1.00	0.33	0.00	0.23	1.23
Drive System	6	6.20	1.03	0.02	10.94	1.82	0.04	1.46	12.40
Hydraulic	—	—	—	—	—	—	—	—	—
Instrumentation	—	—	—	—	—	—	—	—	—
Electrical	—	—	—	—	—	—	—	—	—
Fuel	—	—	—	—	—	—	—	—	—
Flight Controls	—	—	—	—	—	—	—	—	—
Utility	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	—	—	—	—	—	—	—	—	—
Auxiliary Power Unit (APU)	—	—	—	—	—	—	—	—	—
Avionics	—	—	—	—	—	—	—	—	—
Armament	—	—	—	—	—	—	—	—	—
Unspecified	8	8.80	1.10	0.03	11.31	1.41	0.04	2.30	13.61
TOTALS	17	16.00	0.94*	0.05	23.25	1.37*	0.08	3.99	27.24

*Weighted Average
**Maintenance Man Hours Indirect

UNSCHEDULED MAINTENANCE ON BOTH SIKORSKY AIRCRAFT S50 AND S52
FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE DURING DT II
BASED ON 304.6 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			** MMHI	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	13	9.00	0.69	0.03	14.76	1.14	0.05	0.56	15.32
Landing Gear	3	1.50	0.50	0.01	2.34	0.78	0.01	0.03	2.37
Power Plant and Pneumatic System	17	20.90	1.23	0.07	30.15	1.77	0.10	0.43	30.58
Drive System	23	31.10	1.35	0.10	51.34	2.23	0.17	1.78	53.12
Hydraulic	25	19.50	0.78	0.06	28.84	1.15	0.09	1.23	30.07
Instrumentation	—	—	—	—	—	—	—	—	—
Electrical	6	3.00	0.50	0.01	3.05	0.51	0.01	0.00	3.05
Fuel	6	6.60	1.10	0.02	7.34	1.22	0.02	0.16	7.50
Flight Controls	13	19.20	1.48	0.06	29.23	2.25	0.10	3.77	33.00
Utility	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	1	0.30	0.30	0.00	0.43	0.43	0.00	0.00	0.43
Auxiliary Power Unit (APU)	—	—	—	—	—	—	—	—	—
Avionics	3	1.20	0.40	0.00	1.31	0.44	0.00	0.15	1.46
Armament	—	—	—	—	—	—	—	—	—
Unspecified	2	0.60	0.30	0.00	0.71	0.36	0.00	0.00	0.36
TOTALS	112	112.90	1.01*	0.37	169.50	1.51*	0.56	8.11	177.61

*Weighted Average
**Maintenance Man Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED ON BOTH SIKORSKY AIRCRAFT S50 AND S52
FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE DURING DT II
BASED ON 304.6 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	** MMHI	MMHD plus MMHI
Airframe	13	9.00	0.69	0.03	14.76	1.14	0.05	0.56	15.32
Landing Gear	5	3.80	0.76	0.01	5.57	1.11	0.02	2.33	7.90
Power Plant and Pneumatic System	20	21.90	1.10	0.07	31.15	1.56	0.10	0.66	31.81
Drive System	29	37.30	1.29	0.12	62.28	2.15	0.20	3.24	65.52
Hydraulic	25	19.50	0.78	0.06	28.84	1.15	0.10	1.23	30.07
Instrumentation	—	—	—	—	—	—	—	—	—
Electrical	6	3.00	0.50	0.01	3.05	0.51	0.01	0.00	3.05
Fuel	6	6.60	1.10	0.02	7.34	1.22	0.02	0.16	7.50
Flight Controls	13	19.20	1.48	0.06	29.23	2.25	0.10	3.77	33.00
Utility	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	1	0.30	0.30	0.00	0.43	0.43	0.00	0.00	0.43
Auxiliary Power Unit (APU)	—	—	—	—	—	—	—	—	—
Avionics	3	1.20	0.40	0.00	1.31	0.44	0.00	0.15	1.46
Armament	—	—	—	—	—	—	—	—	—
Unspecified	8	7.10	0.89	0.02	8.79	1.10	0.03	0.00	8.08
TOTALS	129	128.90	1.00*	0.42	192.75	1.49*	0.63	12.10	204.85

*Weighted Average
**Maintenance Man Hours Indirect

APPENDIX 20

SCHEDULED AND UNSCHEDULED MAINTENANCE OF THE SIKORSKY UTTAS DURING DT II CATEGORIZED BY MAINTENANCE FUNCTION

SCHEDULED MAINTENANCE ON SIKORSKY AIRCRAFT S50 DURING DT-II BASED ON 110.3 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM): ACM	ACM Per Event	ACM Per Flight Hour	Maintenance Man Hours Direct (MMHD): MMHD	MMHD Per Event	MMHD Per Flight Hour	** MMHI	MMHD plus MMHI
Inspect	191	85.70	0.45	0.78	129.68	0.68	1.18	3.00	132.68
Test	2	0.08	0.00	0.00	0.00	0.00	0.00	0.57	0.57
Service	3	1.50	0.50	0.01	2.15	0.72	0.02	0.05	2.20
Adjust	11	1.80	0.16	0.02	2.04	0.19	0.02	0.05	2.09
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	-	-	-	-	-	-	-	-	-
Remove/Replace	1	0.90	0.90	0.01	1.01	1.01	0.01	0.10	1.11
Repair	-	-	-	-	-	-	-	-	-
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	7	3.80	0.54	0.03	5.15	0.74	0.05	0.20	5.35
Fault Location	-	-	-	-	-	-	-	-	-
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/ Assemble	-	-	-	-	-	-	-	-	-
Remove	-	-	-	-	-	-	-	-	-
Modification Work Order	26	8.60	0.33	0.08	9.63	0.37	0.09	26.24	35.87
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Totals	241	102.30	0.42*	0.93	149.66	0.62*	1.36	30.21	179.27

*Weighted Average; **Maintenance Man Hours Indirect

UNSCHEDULED MAINTENANCE ON SIKORSKY AIRCRAFT S50 DURING DT-II BASED ON 110.3 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			** MMHI	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Inspect	26	4.90	0.19	0.04	6.80	0.26	0.06	0.42	7.22
Test	22	6.90	0.31	0.06	12.15	0.55	0.11	0.28	12.43
Service	19	12.00	0.63	0.11	16.11	0.85	0.15	0.27	16.38
Adjust	21	5.00	0.24	0.05	8.40	0.40	0.08	0.34	8.74
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	4	0.40	0.10	0.00	0.41	0.10	0.00	0.00	0.41
Remove/Replace	53	58.10	1.10	0.53	86.36	1.63	0.78	1.56	87.92
Repair	20	15.11	0.76	0.14	20.08	1.00	0.18	0.40	20.48
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	1	0.10	0.10	0.00	0.09	0.90	0.00	0.00	0.09
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/ Assemble	4	2.00	0.50	0.02	3.13	0.78	0.03	0.08	3.21
Remove	-	-	-	-	-	-	-	-	-
Modification Work Order	-	-	-	-	-	-	-	-	-
Cannibalize	1	0.70	0.70	0.01	0.80	0.80	0.01	0.00	0.80
Safety Wire	3	0.90	0.30	0.01	0.96	0.32	0.01	0.04	1.00
Other	2	0.50	0.25	0.01	0.51	0.26	0.01	0.00	0.51
Totals	176	106.60	0.61*	0.97	155.80	0.89*	1.41	3.39	159.19

*Weighted Average; **Maintenance Man Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED ON SIKORSKY AIRCRAFT S50 DURING DT-II BASED ON 110.3 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM): ACM	ACM Per Event	ACM Per Flight Hour	Maintenance Man Hours Direct (MMHD): MMHD	MMHD Per Event	MMHD Per Flight Hour	** MMHI	MMHD plus MMHI
Inspect	217	90.6	0.42	0.82	136.48	0.63	1.24	3.42	139.90
Test	24	6.90	0.29	0.06	12.15	0.51	0.11	0.85	13.00
Service	22	13.50	0.61	0.12	18.26	0.83	0.17	0.32	18.58
Adjust	32	6.80	0.21	0.06	10.44	0.33	0.10	0.39	10.83
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	4	0.40	0.10	0.00	0.41	0.10	0.00	0.00	0.41
Remove/Replace	54	59.00	1.09	0.54	87.37	1.62	0.79	1.66	89.03
Repair	20	15.10	0.76	0.14	20.08	1.00	0.18	0.40	20.48
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	7	3.80	0.54	0.34	5.15	0.74	0.05	0.20	5.35
Fault Location	1	0.10	0.10	0.00	0.09	0.09	0.00	0.00	0.09
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/Assemble	4	2.00	0.50	0.02	3.13	0.78	0.28	0.08	3.21
Remove	-	-	-	-	-	-	-	-	-
Modification Work Order	26	8.60	0.33	0.08	9.63	0.37	0.09	26.24	35.87
Cannibalize	[illegible]	0.70	0.70	0.01	0.80	0.80	0.01	0.00	0.80
Safety Wire	3	0.90	0.30	0.01	0.96	0.32	0.01	0.04	1.00
Other	2	0.59	0.25	0.01	0.51	0.26	0.01	0.00	0.41
Totals	417	208.90	0.50*	1.89	305.46	0.73*	2.77	33.60	338.96

*Weighted Average; **Maintenance Man Hours Indirect

SCHEDULED MAINTENANCE ON SIKORSKY AIRCRAFT SS2 DURING DT-II BASED ON 194.3 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM) ACM	ACM Per Event	ACM Per Flight Hour	Maintenance Man Hours Direct (MMHD) MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Inspect	264	123.90	0.47	0.64	187.78	0.71	0.97	1.38	189.16
Test	3	0.00	0.00	0.00	0.02	0.00	0.00	0.74	0.76
Service	2	1.50	0.75	0.01	1.82	0.91	0.01	0.03	1.85
Adjust	9	2.80	0.31	0.14	2.74	0.30	0.01	0.02	2.76
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	-	-	-	-	-	-	-	-	-
Remove/Replace	1	1.40	1.40	0.01	2.22	2.22	0.01	2.20	4.42
Repair	-	-	-	-	-	-	-	-	-
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	11	6.70	0.61	0.03	13.59	1.24	0.07	1.46	15.05
Fault Location	-	-	-	-	-	-	-	-	-
Operation	-	-	-	-	-	-	-	-	-
Lubricate	6	3.90	0.65	0.02	3.84	0.64	0.02	0.00	3.84
Disassemble/ Assemble	1	3.50	3.50	0.02	6.92	6.92	0.04	1.18	8.10
Remove	-	-	-	-	-	-	-	-	-
Modification Work Order	27	8.20	0.30	0.04	10.89	0.40	0.06	38.81	49.70
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Totals	326	151.90	0.47**	0.78	229.90	0.71**	1.18	45.82	275.64

*Weighted Average
**Maintenance Man-Hours Indirect

UNSCHEDULED MAINTENANCE ON SIKORSKY AIRCRAFT S52 DURING DT-II BASED ON 194.3 FLIGHT HOURS

Maintenance Function	Actual Clock Maintenance (ACM)				Maintenance Man Hours Direct (MMHD)				
	Number of Events	ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Inspect	23	7.40	0.32	0.04	9.43	0.41	0.05	0.39	9.82
Test	21	9.60	0.46	0.05	12.85	0.61	0.07	0.82	13.67
Service	22	5.00	0.23	0.03	6.95	0.32	0.04	0.34	7.29
Adjust	25	8.20	0.33	0.04	9.97	0.40	0.05	0.27	10.24
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	11	1.60	0.15	0.01	1.63	0.15	0.01	0.05	1.68
Remove/Replace	78	73.80	0.95	0.38	109.12	1.40	0.56	6.43	115.55
Repair	32	41.30	0.53	0.21	60.81	1.90	0.31	2.57	63.38
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	-	-	-	-	-	-	-	-	-
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/ Assemble	4	2.5	0.63	0.01	2.79	0.70	0.01	0.05	2.84
Remove	3	0.30	0.10	0.00	0.42	0.14	0.00	0.00	0.42
Modification Work Order	-	-	-	-	-	-	-	-	-
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	5	1.10	0.22	0.01	1.59	0.32	0.01	0.10	1.69
Other	-	-	-	-	-	-	-	-	-
Totals	224	150.80	0.67**	0.78	215.56	0.96**	1.11	11.02	226.58

*Weighted Average
**Maintenance Man-Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED ON SIKORSKY AIRCRAFT S52 DURING DT-II BASED ON 194.3 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM) ACM	ACM Per Event	ACM Per Flight Hour	Maintenance Man Hours Direct (MMHD) MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Inspect	287	131.30	0.46	0.68	197.21	0.69	1.02	1.77	198.98
Test	24	9.60	0.40	0.05	12.87	0.54	0.07	1.56	14.43
Service	24	6.50	0.27	0.03	8.77	0.37	0.05	0.37	9.14
Adjust	34	11.00	0.32	0.06	12.71	0.37	0.07	0.29	13.00
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	11	1.60	0.15	0.01	1.63	0.15	0.01	0.05	1.68
Remove/Replace	79	75.2	0.95	0.39	111.34	1.41	0.57	8.63	119.97
Repair	32	41.3	1.29	0.21	60.81	1.90	0.31	2.57	63.38
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	11	6.70	0.61	0.03	13.59	1.24	0.07	1.46	15.05
Fault Location	-	-	-	-	-	-	-	-	-
Operation	-	-	-	-	-	-	-	-	-
Lubricate	8	3.90	0.49	0.02	3.92	0.49	0.02	0.00	
Disassemble/Assemble	5	6.00	1.20	0.03	9.71	1.94	0.05	1.23	3.92
Remove	3	0.30	0.10	0.00	0.42	0.14	0.00	0.00	0.42
Modification Work Order	27	8.20	0.30	0.04	10.89	0.40	0.06	38.81	49.70
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	5	1.10	0.55	0.01	1.59	0.32	0.01	0.10	1.69
Other	-	-	-	-	-	-	-	-	-
Totals	550	302.70	0.55 *	1.56	445.46	0.81 *	2.29	56.84	502.3

*Weighted Average
**Maintenance Man-Hours Indirect

SCHEDULED MAINTENANCE ON BOTH SIKORSKY AIRCRAFT 550 AND 552 DURING DT-II BASED ON 304.6 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM) ACM	ACM Per Event	ACM Per Flight Hour	Maintenance Man Hours Direct (MMHD) MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Inspect	454	209.20	0.46	0.69	317.01	0.70	1.04	4.38	321.39
Test	5	0.00	0.00	0.00	0.02	0.00	0.00	1.31	1.33
Service	5	3.00	0.60	0.01	3.97	0.79	0.01	0.08	4.05
Adjust	20	4.60	0.23	0.02	4.78	0.24	0.02	0.07	4.85
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	-	-	-	-	-	-	-	-	-
Remove/Replace	2	2.30	1.15	0.01	3.23	1.62	0.01	2.30	5.53
Repair	-	-	-	-	-	-	-	-	-
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	18	10.50	0.58	0.03	18.74	1.04	0.06	1.66	20.40
Fault Location	-	-	-	-	-	-	-	-	-
Operation	-	-	-	-	-	-	-	-	-
Lubricate	6	3.90	0.65	0.01	3.84	0.64	0.01	0.00	3.84
Disassemble/ Assemble	1	3.50	3.50	0.01	6.92	6.92	0.02	1.18	8.10
Remove	-	-	-	-	-	-	-	-	-
Modification Work Order	53	16.80	0.32	0.06	20.52	0.39	0.07	65.05	85.57
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	-	-	-	-	-	-	-	-	-
Other	3	0.40	0.13	0.00	0.53	0.18	0.00	0.00	0.53
Totals	567	254.2	0.45*	0.84	379.56	0.67*	1.25	76.03	455.59

*Weighted Average
**Maintenance Man-Hours Indirect

UNSCHEDULED MAINTENANCE ON BOTH SIKORSKY AIRCRAFT S50 AND S52 DURING DT-II BASED ON 304.6 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Inspect	49	12.30	0.25	0.04	16.23	0.33	0.05	0.81	17.04
Test	44	16.50	0.38	0.05	25.02	0.57	0.08	1.10	26.12
Service	41	17.00	0.42	0.06	23.06	0.56	0.08	0.61	23.67
Adjust	46	13.20	0.29	0.04	18.37	0.40	0.06	0.61	18.98
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	15	2.00	0.13	0.01	2.04	0.14	0.01	0.05	2.09
Remove/Replace	131	131.90	1.01	0.43	195.48	1.49	0.64	7.99	203.47
Repair	52	56.40	1.09	0.19	80.89	1.56	0.27	2.97	83.86
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	1	0.10	0.10	0.00	0.09	0.09	0.00	0.00	0.09
Operation	-	-	-	-	-	-	-	-	-
Lubricate	2	0.00	0.00	0.00	0.08	0.04	0.00	0.00	0.08
Disassemble/ Assemble	8	4.50	0.56	0.02	5.92	0.74	0.02	0.13	6.05
Remove	3	0.30	0.10	0.00	0.42	0.14	0.00	0.00	0.42
Modification Work Order	-	-	-	-	-	-	-	-	-
Cannibalize	1	0.70	0.70	0.00	0.80	0.80	0.00	0.00	0.80
Safety Wire	7	2.50	0.36	0.01	2.96	0.42	0.01	0.14	3.10
Other	-	-	-	-	-	-	-	-	-
Totals	400	257.4	0.64*	0.85	371.36	0.93*	1.22	14.41	385.77

*Weighted Average
**Maintenance Man-Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED ON BOTH SIKORSKY AIRCRAFT S50 AND S52 DURING DT-II BASED ON 304.6 HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM) ACM	ACM Per Event	ACM Per Flight Hour	Maintenance Man Hours Direct (MMHD) MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Inspect	503	221.50	0.44	0.73	333.24	0.66	1.09	5.19	338.43
Test	49	16.50	0.34	0.05	25.04	0.51	0.08	2.41	27.45
Service	46	20.00	0.44	0.07	27.03	0.59	0.09	0.69	27.72
Adjust	66	17.80	0.27	0.06	23.15	0.35	0.08	0.68	23.83
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	15	2.00	0.13	0.01	2.04	0.14	0.01	0.05	2.09
Remove/Replace	133	134.20	1.01	0.44	198.71	1.49	0.65	10.29	209.00
Repair	52	56.40	1.09	0.19	80.89	1.56	0.27	2.97	83.86
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	18	10.50	0.58	0.03	18.74	1.04	0.06	1.66	20.40
Fault Location	1	0.10	0.10	0	0.09	0.09	0.00	0.00	0.09
Operation	-	-	-	-	-	-	-	-	-
Lubricate	8	3.90	0.49	0.01	3.92	0.49	0.01	0.00	3.92
Disassemble/ Assemble	9	8.00	0.89	0.03	12.84	1.43	0.04	1.31	14.15
Remove	3	0.30	0.10	0.00	0.42	0.14	0.00	0.00	0.42
Modification Work Order	53	16.80	0.32	0.06	20.52	0.39	0.07	65.05	85.57
Cannibalize	1	0.70	0.70	0.00	0.80	0.80	0.00	0.00	0.80
Safety Wire	8	2.00	0.25	0.01	2.55	0.32	0.01	0.14	2.69
Other	2	0.90	0.45	0.00	13.78	6.89	0.05	0.00	13.78
Totals	967	511.60	0.53*	1.68	750.92	0.78*	2.465	90.44	841.36

*Weighted Average
**Maintenance Man-Hours Indirect

APPENDIX 21

SCHEDULED AND UNSCHEDULED MAINTENANCE OF THE SIKORSKY UTTAS
FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE
DURING DT II CATEGORIZED BY MAINTENANCE FUNCTION

SCHEDULED MAINTENANCE ON SIKORSKY AIRCRAFT S50 FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE DURING DT-II BASED ON 110.3 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Inspect	4	2.00	0.50	0.02	2.69	1.35	0.02	0.08	2.77
Test	-	-	-	-	-	-	-	-	-
Service	1	0.80	0.80	0.01	1.50	1.50	0.01	0.05	1.55
Adjust	1	0.70	0.70	0.01	0.94	0.94	0.01	0.05	0.99
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	-	-	-	-	-	-	-	-	-
Remove/Replace	1	0.90	0.90	0.01	1.01	1.01	0.01	0.10	1.11
Repair	-	-	-	-	-	-	-	-	-
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	-	-	-	-	-	-	-	-	-
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/ Assemble	-	-	-	-	-	-	-	-	-
Remove	-	-	-	-	-	-	-	-	-
Modification Work Order	14	5.90	0.42	0.05	6.92	0.49	0.06	16.91	23.83
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Totals	21	10.30	0.49*	0.09	13.06	0.62*	0.12	17.19	30.25

*Weighted Average
**Maintenance Man-Hours Indirect

UNSCHEDULED MAINTENANCE ON SIKORSKY AIRCRAFT S50 FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE DURING DT-II BASED ON 110.3 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Inspect	4	0.80	0.20	0.01	0.77	0.19	0.01	0.17	0.94
Test	4	1.20	0.30	0.01	1.37	0.34	0.01	0.15	1.52
Service	5	2.70	0.54	0.02	3.35	0.67	0.03	0.08	3.43
Adjust	4	0.40	0.10	0.00	0.60	0.15	0.01	0.02	0.62
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	-	-	-	-	-	-	-	-	-
Remove/Replace	27	44.50	1.65	0.40	69.19	2.56	0.63	1.38	70.57
Repair	8	8.80	1.10	0.08	11.74	1.47	0.11	0.37	12.11
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	1	0.10	0.10	0.00	0.09	0.09	0.00	0.00	0.09
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/ Assemble	-	-	-	-	-	-	-	-	-
Remove	-	-	-	-	-	-	-	-	-
Modification Work Order	-	-	-	-	-	-	-	-	-
Cannibalize	1	0.70	0.70	0.01	0.80	0.80	0.01	0.00	0.80
Safety Wire	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Totals	54	59.20	1.10**	0.54	87.91	1.63**	0.89	2.17	90.08

*Weighted Average
**Maintenance Man-Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED ON SIKORSKY AIRCRAFT S50 FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE DURING DT-II BASED ON 110.3 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Inspect	8	2.80	0.35	0.03	3.46	0.43	0.03	0.25	3.71
Test	4	1.20	0.30	0.01	1.37	0.34	0.01	0.15	1.52
Service	6	3.50	0.58	0.03	4.85	0.81	0.04	0.13	4.98
Adjust	5	1.10	0.22	0.01	1.54	0.31	0.01	0.07	1.61
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	-	-	-	-	-	-	-	-	-
Remove/Replace	28	45.40	1.62	0.41	70.20	2.51	0.64	1.48	71.68
Repair	8	8.80	1.10	0.08	11.74	1.47	0.11	0.37	12.11
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	1	0.10	0.10	0.00	0.09	0.09	0.00	0.00	0.09
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/ Assemble	-	-	-	-	-	-	-	-	-
Remove	-	-	-	-	-	-	-	-	-
Modification Work Order	14	5.90	0.42	0.05	6.92	0.49	0.06	16.91	23.83
Cannibalize	1	0.70	0.70	0.01	0.80	0.80	0.01	0.00	0.80
Safety Wire	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Totals	75	69.50	0.93*	0.63	100.95	1.35**	0.92	19.36	120.31

*Weighted Average
**Maintenance Man-Hours Indirect

SCHEDULED MAINTENANCE ON SIKORSKY AIRCRAFT S52 FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE DURING DT-II BASED ON 194.3 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Inspect	7	5.50	0.79	0.03	6.42	0.92	0.03	0.30	6.72
Test	-	-	-	-	-	-	-	-	-
Service	1	1.20	1.20	0.01	1.55	1.55	0.01	0.03	1.58
Adjust	-	-	-	-	-	-	-	-	-
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	-	-	-	-	-	-	-	-	-
Remove/Replace	1	1.40	1.40	0.01	2.22	2.22	0.01	2.20	4.42
Repair	-	-	-	-	-	-	-	-	-
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	-	-	-	-	-	-	-	-	-
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/ Assemble	1	3.50	3.50	0.02	6.92	6.92	0.04	1.18	8.10
Remove	-	-	-	-	-	-	-	-	-
Modification Work Order	5	1.30	0.26	0.01	1.66	0.33	0.01	2.21	3.87
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Totals	15	12.90	0.86**	0.07	18.77	1.25**	0.10	5.92	24.69

*Weighted Average
**Maintenance Man-Hours Indirect

UNSCHEDULED MAINTENANCE ON SIKORSKY AIRCRAFT S52 FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE DURING DT-II BASED ON 194.3 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Inspect	3	1.00	0.33	0.01	1.20	0.40	0.01	0.05	1.25
Test	4	3.30	0.83	0.02	5.92	1.48	0.03	0.82	6.74
Service	4	3.20	0.80	0.02	5.26	1.32	0.03	0.34	5.60
Adjust	5	1.70	0.34	0.01	1.75	0.35	0.01	0.27	2.02
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	2	0.60	0.30	0.00	0.52	0.26	0.00	0.05	0.57
Remove/Replace	24	27.90	1.16	0.14	43.63	1.82	0.22	3.84	47.47
Repair	8	12.90	1.61	0.07	19.40	2.43	0.10	0.42	19.82
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	-	-	-	-	-	-	-	-	-
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/ Assemble	3	2.30	0.77	0.01	2.62	0.77	0.01	0.05	2.67
Remove	2	0.20	0.10	0.00	0.30	0.15	0.00	0.00	0.30
Modification Work Order	-	-	-	-	-	-	-	-	-
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	3	0.60	0.20	0.00	0.99	0.33	0.01	0.10	1.09
Other	-	-	-	-	-	-	-	-	-
Totals	58	53.70	0.93**	0.28	81.59	1.41**	0.42	5.94	87.53

*Weighted Average
**Maintenance Man-Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED ON SIKORSKY AIRCRAFT S52 FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE DURING DT-II BASED ON 194.3 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Inspect	10	6.50	0.65	0.03	7.62	0.76	0.04	0.35	7.97
Test	4	3.30	0.83	0.02	5.92	1.48	0.03	0.82	6.74
Service	5	4.40	0.88	0.02	6.81	1.36	0.04	0.37	7.18
Adjust	5	1.70	0.34	0.01	1.75	0.35	0.01	0.27	2.02
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	2	0.60	0.30	0.00	0.52	0.26	0.00	0.05	0.57
Remove/Replace	25	29.30	1.17	0.15	45.85	1.83	0.23	6.04	51.89
Repair	8	12.90	1.61	0.07	19.40	2.43	0.10	0.42	19.82
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	-	-	-	-	-	-	-	-	-
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/ Assemble	4	5.80	1.45	0.03	9.54	2.77	0.05	1.23	10.77
Remove	2	0.20	0.10	0.00	0.30	0.15	0.00	0.00	0.30
Modification Work Order	5	1.30	0.26	0.01	1.66	0.33	0.01	2.21	3.87
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	3	0.60	0.20	0.00	0.99	0.33	0.01	0.10	1.09
Other	-	-	-	-	-	-	-	-	-
Totals	73	66.60	0.91**	0.34	100.36	1.37*	0.52	11.86	112.22

*Weighted Average
**Maintenance Man-Hours Indirect

SCHEDULED MAINTENANCE ON BOTH SIKORSKY AIRCRAFT S50 AND S52 FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE DURING DT-II BASED ON 304.6 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Inspect	11	9.30	0.85	0.03	9.11	0.83	0.03	0.38	9.49
Test	-	-	-	-	-	-	-	-	-
Service	2	0.20	0.10	0.00	3.05	1.53	0.01	0.08	3.13
Adjust	1	0.70	0.70	0.00	0.94	0.94	0.00	0.05	0.99
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	-	-	-	-	-	-	-	-	-
Remove/Replace	2	2.30	1.15	0.01	3.23	1.62	0.01	2.30	5.53
Repair	-	-	-	-	-	-	-	-	-
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	-	-	-	-	-	-	-	-	-
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/ Assemble	1	3.50	3.50	0.01	6.92	6.92	0.02	1.18	8.10
Remove	-	-	-	-	-	-	-	-	-
Modification Work Order	19	7.20	0.38	0.02	8.58	0.45	0.03	19.12	27.70
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Totals	36	23.20	0.64**	0.08	31.83	0.88**	0.10	23.11	54.94

*Weighted Average
**Maintenance Man-Hours Indirect

UNSCHEDULED MAINTENANCE ON BOTH SIKORSKY AIRCRAFT S50 AND S52 FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE DURING DT-II BASED ON 304.6 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)					
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	**MMHI	MMHD plus MMHI
Inspect	7	1.80	0.26	0.01	1.97	0.28	0.01	0.22	2.19
Test	8	4.50	0.56	0.01	7.29	0.91	0.02	0.97	8.26
Service	9	5.90	0.66	0.02	8.61	0.96	0.03	0.42	9.03
Adjust	9	2.10	0.23	0.01	2.35	0.26	0.01	0.29	2.64
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	2	0.60	0.30	0.00	0.52	0.26	0.00	0.05	0.57
Remove/Replace	51	72.40	1.42	0.24	112.82	2.21	0.37	5.22	118.04
Repair	16	21.70	1.36	0.07	31.14	1.95	0.10	0.79	31.93
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	1	0.10	0.10	0.00	0.09	0.09	0.00	0.00	0.09
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/Assemble	3	2.30	0.77	0.01	2.62	0.87	0.01	0.05	2.67
Remove	2	0.20	0.10	0.00	0.30	0.15	0.00	0.00	0.30
Modification Work Order	-	-	-	-	-	-	-	-	-
Cannibalize	1	0.70	0.70	0.00	0.80	0.80	0.00	0.00	0.80
Safety Wire	3	0.60	0.20	0.00	0.99	0.33	0.00	0.10	1.09
Other	-	-	-	-	-	-	-	-	-
Totals	112	112.90	1.01**	0.37	169.50	1.51**	0.56	8.11	177.61

*Weighted Average
**Maintenance Man-Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED ON BOTH SIKORSKY AIRCRAFT S50 AND S52 FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE DURING DT-II BASED ON 304.6 FLIGHT HOURS

Maintenance Function	Actual Clock Maintenance (ACM)				Maintenance Man Hours Direct (MMHD)				
	Number of Events	ACM	ACM Per Even	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Inspect	18	9.30	0.52	0.03	11.08	0.62	0.04	0.60	11.68
Test	8	4.50	0.56	0.01	7.29	0.91	0.02	0.97	8.26
Service	11	7.90	0.72	0.03	11.66	1.06	0.04	0.50	12.16
Adjust	10	2.80	0.28	0.01	3.29	0.33	0.01	0.34	3.63
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	2	0.60	0.30	0.00	0.52	0.26	0.00	0.05	0.57
Remove/Replace	53	74.70	1.41	0.25	116.05	2.18	0.38	7.52	123.57
Repair	16	21.70	1.36	0.07	31.14	1.95	0.10	0.79	31.93
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	1	0.10	0.10	0.00	0.09	0.09	0.00	0.00	0.09
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/ Assemble	4	5.80	1.45	0.02	9.54	2.77	0.03	1.23	10.77
Remove	2	0.20	0.10	0.05	0.30	0.15	0.00	0.00	0.30
Modification Work Order	19	7.20	0.38	0.02	8.58	0.35	0.03	19.12	27.70
Cannibalize	1	0.70	0.70	0.00	0.80	0.80	0.00	0.00	0.80
Safety Wire	3	0.60	0.20	0.00	0.99	0.33	0.00	0.10	1.09
Other	-	-	-	-	-	-	-	-	-
Totals	148	136.10	0.92**	0.45	201.33	1.36**	0.66	31.22	232.55

*Weighted Average
**Maintenance Man-Hours Indirect

APPENDIX 22

SCHEDULED AND UNSCHEDULED MAINTENANCE OF THE SIKORSKY UTTAS DURING OT II CATEGORIZED BY SUBSYSTEM

SCHEDULED MAINTENANCE FOR BOTH SIKORSKY AIRCRAFT 550 AND 552
DURING OT-II BASED ON 202.5 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Airframe	2	0.20	0.10	0.00	0.19	0.10	0.00	0.00	0.19
Landing Gear	-	-	-	-	-	-	-	-	-
Power Plant and Pneumatic System	2	0.00	0.00	0.00	0.04	0.02	0.00	0.00	0.04
Drive System	61	15.50	0.25	0.08	19.53	0.32	0.10	3.04	22.57
Hydraulic	-	-	-	-	-	-	-	-	-
Instrumentation	-	-	-	-	-	-	-	-	-
Electrical	-	-	-	-	-	-	-	-	-
Fuel	-	-	-	-	-	-	-	-	-
Flight Controls	-	-	-	-	-	-	-	-	-
Utility	1	2.00	2.00	0.01	1.95	1.95	0.01	0.00	1.95
Cargo and Personnel Handling Equipment	-	-	-	-	-	-	-	-	-
Auxiliary Power Unit (APU)	-	-	-	-	-	-	-	-	-
Avionics	-	-	-	-	-	-	-	-	-
Armament	-	-	-	-	-	-	-	-	-
Unspecified	136	72.90	0.54	0.36	105.32	0.77	0.52	0.27	105.59
TOTALS	202	90.60	0.45*	0.45	127.03	0.63*	0.63	3.31	130.34

*Weighted Average
**Maintenance Man-Hours Indirect

UNSCHEDULED MAINTENANCE FOR BOTH SIKORSKY AIRCRAFT S50 AND S52
DURING OT-II BASED ON 202.3 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	** MMHI	MMHD plus MMHI
Airframe	38	28.50	0.75	0.14	49.77	1.31	0.25	0.35	50.12
Landing Gear	9	0.90	0.10	0.00	0.80	0.09	0.00	0.05	0.85
Power Plant and Pneumatic System	14	11.30	0.81	0.06	13.64	0.97	0.07	0.06	13.70
Drive System	51	45.20	0.89	0.22	70.74	1.39	0.35	0.49	71.23
Hydraulic	7	2.00	0.29	0.01	2.03	0.29	0.01	0.00	2.03
Instrumentation	1	0.20	0.20	0.00	0.20	0.20	0.00	0.00	0.20
Electrical	16	5.60	0.35	0.03	7.35	0.46	0.04	0.00	7.35
Fuel	2	0.60	0.30	0.00	1.82	0.91	0.01	0.00	1.82
Flight Controls	14	28.10	2.01	0.14	56.05	4.00	0.28	0.12	56.17
Utility	5	2.80	0.56	0.01	2.68	0.54	0.01	0.00	2.68
Cargo and Personnel Handling Equipment	11	1.20	0.11	0.01	1.13	0.10	0.01	0.00	1.13
Auxiliary Power Unit (APU)	-	-	-	-	-	-	-	-	-
Avionics	13	19.10	0.70	0.05	11.35	0.87	0.06	0.07	11.42
Armament	-	-	-	-	-	-	-	-	-
Unspecified	11	3.20	0.29	0.02	5.42	0.49	0.03	0.00	5.42
TOTALS	192	138.70	0.72*	0.69	222.98	1.16*	1.10	1.14	224.12

*Weighted Average
**Maintenance Man-Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED FOR BOTH SIKORSKY AIRCRAFT
S50 AND S52 FOR OT-II BASED ON 202.5 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	** MMHI	MMHD plus MMHI
Airframe	40	28.70	0.72	0.14	49.96	1.25	0.25	0.35	50.31
Landing Gear	9	0.90	0.10	0.00	0.80	0.09	0.00	0.05	0.85
Power Plant and Pneumatic System	16	11.30	0.71	0.06	13.68	0.86	0.07	0.06	13.74
Drive System	112	60.70	0.54	0.30	90.27	0.81	0.45	3.53	93.80
Hydraulic	7	2.00	0.29	0.01	2.03	0.29	0.01	0.00	2.03
Instrumentation	1	0.20	0.20	0.00	0.20	0.20	0.00	0.00	0.20
Electrical	16	5.60	0.35	0.03	7.35	0.46	0.04	0.00	7.35
Fuel	2	0.60	0.30	0.00	1.82	0.91	0.01	0.00	1.82
Flight Controls	14	28.10	2.01	0.13	56.05	4.00	0.28	0.12	56.17
Utility	6	4.80	0.80	0.02	4.63	0.77	0.02	0.00	4.63
Cargo and Personnel Handling Equipment	11	1.20	0.11	0.01	1.13	0.10	0.01	0.00	1.13
Auxiliary Power Unit (APU)	-	-	-	-	-	-	-	-	-
Avionics	13	9.10	0.70	0.05	11.35	0.87	0.06	0.07	11.42
Armament	-	-	-	-	-	-	-	-	-
Unspecified	147	76.10	0.52	0.38	110.74	0.75	0.55	0.27	111.01
TOTALS	394	229.30	0.58*	1.13	350.01	0.89*	1.73	4.45	354.46

*Weighted Average
**Maintenance Man-Hours Indirect

SCHEDULED MAINTENANCE FOR BOTH SIKORSKY AIRCRAFT S50 AND S52
FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE DURING OT II
BASED ON 202.5 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	** MMHI	MMHD plus MMHI
Airframe	-	-	-	-	-	-	-	-	-
Landing Gear	-	-	-	-	-	-	-	-	-
Power Plant and Pneumatic System	-	-	-	-	-	-	-	-	-
Drive System	7	7.80	1.11	0.04	11.83	1.69	0.06	0.07	11.90
Hydraulic	-	-	-	-	-	-	-	-	-
Instrumentation	-	-	-	-	-	-	-	-	-
Electrical	-	-	-	-	-	-	-	-	-
Fuel	-	-	-	-	-	-	-	-	-
Flight Controls	-	-	-	-	-	-	-	-	-
Utility	1	2.00	2.00	0.01	1.95	1.95	0.01	0.00	1.95
Cargo and Personnel Handling Equipment	-	-	-	-	-	-	-	-	-
Auxiliary Power Unit (APU)	-	-	-	-	-	-	-	-	-
Avionics	-	-	-	-	-	-	-	-	-
Armament	-	-	-	-	-	-	-	-	-
Unspecified	1	11.30	11.30	0.06	17.24	17.24	0.09	0.27	17.51
TOTALS	9	21.10	2.34*	0.10	31.02	3.45*	0.15	0.34	31.36

*Weighted Average
**Maintenance Man-Hours Indirect

UNSCHEDULED MAINTENANCE FOR BOTH SIKORSKY AIRCRAFT S50 AND S52
FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE DURING OT-II
BASED ON 202.5 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	12	15.20	1.27	0.08	28.71	2.39	0.14	0.35	29.06
Landing Gear	2	0.20	0.10	0.00	0.12	0.06	0.00	0.00	0.12
Power Plant and Pneumatic System	10	8.60	0.86	0.04	10.75	1.08	0.05	0.06	10.81
Drive System	26	31.50	1.21	0.16	52.91	2.04	0.26	0.07	52.98
Hydraulic	3	1.50	0.50	0.01	1.51	0.50	0.01	0.00	1.51
Instrumentation	-	-	-	-	-	-	-	-	-
Electrical	2	1.70	0.85	0.01	2.77	1.39	0.01	0.00	2.77
Fuel	2	0.60	0.30	0.00	1.82	0.91	0.01	0.00	1.82
Flight Controls	9	11.80	1.31	0.06	22.95	2.55	0.11	0.07	23.02
Utility	1	0.80	0.80	0.00	0.81	0.81	0.00	0.00	0.81
Cargo and Personnel Handling Equipment	4	0.50	0.13	0.00	0.51	0.13	0.00	0.00	0.51
Auxiliary Power Unit (APU)	-	-	-	-	-	-	-	-	-
Avionics	2	5.80	2.90	0.03	7.35	3.68	0.04	0.07	7.42
Armament	-	-	-	-	-	-	-	-	-
Unspecified	4	1.70	0.43	0.01	3.16	0.79	0.02	0.00	3.16
TOTALS	77	79.90	1.04*	0.40	133.37	1.73*	0.66	0.62	133.99

*Weighted Average
**Maintenance Man-Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED FOR BOTH SIKORSKY AIRCRAFT S50 AND S52 FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE DURING OT-II BASED ON 202.5 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM): ACM	ACM Per Event	ACM Per Flight Hour	Maintenance Man Hours Direct (MMHD): MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Airframe	12	15.20	1.27	0.08	28.71	2.39	0.14	0.35	29.06
Landing Gear	2	0.20	0.10	0.00	0.12	0.06	0.00	0.00	0.12
Power Plant and Pneumatic System	10	8.60	0.86	0.04	10.75	1.08	0.05	0.00	10.81
Drive System	33	39.30	1.19	0.19	64.74	1.96	0.32	0.14	64.88
Hydraulic	3	1.50	0.50	0.01	1.51	0.50	0.01	0.00	1.51
Instrumentation	-	-	-	-	-	-	-	-	-
Electrical	2	1.70	0.85	0.01	2.77	1.39	0.01	0.00	2.77
Fuel	2	0.60	0.30	0.00	1.82	0.91	0.01	0.00	1.82
Flight Controls	9	11.80	1.31	0.06	22.95	2.55	0.11	0.07	23.02
Utility	2	2.80	1.40	0.01	2.76	1.38	0.01	0.00	2.76
Cargo and Personnel Handling Equipment	4	0.50	0.13	0.02	0.51	0.13	0.03	0.00	0.51
Auxiliary Power Unit (APU)	-	-	-	-	-	-	-	-	-
Avionics	2	5.80	2.90	0.03	7.35	3.68	0.04	0.07	7.42
Armament	-	-	-	-	-	-	-	-	-
Unspecified	5	13.00	2.60	0.06	20.40	4.08	0.10	0.27	20.07
TOTALS	86	101.00	1.17*	0.50	164.39	1.91*	0.81	0.96	165.35

*Weighted Average
**Maintenance Man-Hours Indirect

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APPENDIX 23

SCHEDULED AND UNSCHEDULED MAINTENANCE OF THE SIKORSKY UTTAS
DURING OT II CATEGORIZED BY MAINTENANCE FUNCTION

SCHEDULED MAINTENANCE FOR BOTH SIKORSKY AIRCRAFT S50 AND S52 DURING OT-II BASED ON 202.5 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Inspect	179	80.00	0.45	0.40	112.94	0.63	0.56	1.64	114.58
Test	2	0.00	0.00	0.00	0.00	0.00	0.00	1.43	1.43
Service	-	-	-	-	-	-	-	-	-
Adjust	13	2.20	0.17	0.01	2.08	0.16	0.01	0.00	2.08
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	2	0.60	0.30	0.00	0.57	0.29	0.00	0.00	0.57
Remove/Replace	1	2.90	2.90	0.01	3.32	3.32	0.02	0.07	3.39
Repair	1	0.10	0.10	0.00	0.08	0.08	0.00	0.00	0.08
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	11	5.00	0.46	0.03	10.24	0.93	0.05	0.00	10.24
Fault Location	-	-	-	-	-	-	-	-	-
Operation	-	-	-	-	-	-	-	-	-
Lubricate	3	1.20	0.04	0.01	1.42	0.47	0.01	0.17	1.59
Disassemble/Assemble	1	3.00	3.00	0.02	6.62	6.62	0.03	0.00	0.62
Remove	-	-	-	-	-	-	-	-	-
Modification Work Order	13	1.10	0.09	0.01	1.45	0.11	0.01	40.49	41.94
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Totals	226	96.70	0.43*	0.48	138.72	0.61*	0.69	43.80	182.52

*Weighted Average, **Maintenance Man-Hours Indirect

UNSCHEDULED MAINTENANCE FOR BOTH SIKORSKY AIRCRAFT S50 AND S52 DURING OT-II
BASED ON 202.5 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM): ACM	ACM Per Event	ACM Per Flight Hour	Maintenance Man Hours Direct (MMHD): MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Inspect	16	4.70	0.29	0.02	7.62	0.48	0.04	0.05	7.67
Test	5	0.20	0.04	0.00	0.24	0.05	0.00	0.00	0.24
Service	22	2.70	0.12	0.01	3.81	0.17	0.02	0.00	3.81
Adjust	10	10.70	1.07	0.05	19.52	1.95	0.10	0.28	19.80
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	4	2.30	0.58	0.01	2.69	0.67	0.01	0.00	2.69
Remove/Replace	78	79.80	1.02	0.39	133.60	1.71	0.66	0.42	134.02
Repair	35	32.70	0.93	0.16	46.99	1.34	0.23	0.34	47.33
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	1	1.50	1.50	0.01	2.74	2.74	0.01	0.00	2.74
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/ Assemble	2	0.30	0.15	0.00	0.31	0.16	0.00	0.05	0.36
Remove	-	-	-	-	-	-	-	-	-
Modification Work Order	-	-	-	-	-	-	-	-	-
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	7	0.60	0.09	0.00	0.63	0.09	0.00	0.00	0.63
Other	12	3.20	0.27	0.02	4.83	0.40	0.02	0.00	4.83
Totals	192	138.70	0.72*	0.69	222.98	1.16*	1.10	1.14	224.12

*Weighted Average, **Maintenance Man-Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED FOR BOTH SIKORSKY AIRCRAFT S50 AND S52 DURING OT-II BASED ON 202.5 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Inspect	195	85.30	0.44	0.42	120.56	0.62	0.60	1.69	122.25
Test	7	0.20	0.03	0.00	0.24	0.03	0.00	1.43	1.67
Service	22	2.70	0.12	0.01	3.81	0.17	0.02	0.00	3.81
Adjust	23	12.99	0.56	0.06	21.60	0.94	0.11	0.28	21.88
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	6	2.90	0.48	0.01	3.26	0.54	0.02	0.00	3.26
Remove/Replace	79	82.70	1.05	0.41	136.92	1.73	0.68	0.49	137.41
Repair	36	32.80	0.91	0.16	47.07	1.31	0.23	0.34	47.41
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	11	5.00	0.46	0.03	10.24	0.93	0.05	0.00	10.24
Fault Location	1	1.50	1.50	0.01	2.74	2.74	0.01	0.00	2.74
Operation	-	-	-	-	-	-	-	-	-
Lubricate	3	1.20	0.40	0.01	1.42	0.47	0.01	0.17	1.59
Disassemble/ Assemble	3	3.30	1.10	0.02	6.93	2.30	0.03	0.05	6.98
Remove	-	-	-	-	-	-	-	-	-
Modification Work Order	13	1.10	0.09	0.01	1.45	0.11	0.01	40.49	41.94
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	7	0.00	0.09	0.00	0.63	0.09	0.00	0.00	0.63
Other	12	3.20	0.27	0.02	4.83	0.40	0.02	0.00	4.83
Totals	418	235.40	0.56*	1.16	361.70	0.87*	1.79	44.94	406.64

*Weighted Average, **Maintenance Man-Hours Indirect

SCHEDULED MAINTENANCE FOR BOTH SIKORSKY AIRCRAFT S50 AND S52 FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE DURING OT-II BASED ON 202.5 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Inspect	6	15.10	2.52	0.08	21.03	3.51	0.10	0.27	21.30
Test	-	-	-	-	-	-	-	-	-
Service	-	-	-	-	-	-	-	-	-
Adjust	1	0.10	0.10	0.00	0.05	0.05	0.00	0.00	0.05
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	-	-	-	-	-	-	-	-	-
Remove/Replace	1	2.90	2.90	0.01	3.32	3.32	0.02	0.07	3.39
Repair	-	-	-	-	-	-	-	-	-
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	-	-	-	-	-	-	-	-	-
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-		-	-	-
Disassemble/Assemble	1	3.00	3.00	0.02	6.62	6.62	0.03	0.00	6.62
Remove	-	-	-	-	-	-	-	-	-
Modification Work Order	5	1.10	0.22	0.01	1.45	0.29	0.07	14.01	15.46
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Totals	14	22.20	1.59*	0.11	32.47	2.32 *	0.16	14.35	46.82

*Weighted Average, **Maintenance Man-Hours Indirect

UNSCHEDULED MAINTENANCE FOR BOTH SIKORSKY AIRCRAFT S50 AND S52 FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE DURING OT-II BASED ON 202.5 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Inspect	9	3.60	0.40	0.02	6.19	0.69	0.03	0.05	6.24
Test	-	-	-	-	-	-	-	-	-
Service	3	0.90	0.30	0.00	2.16	0.72	0.01	0.00	2.16
Adjust	5	7.50	1.52	0.04	14.62	2.92	0.07	0.28	14.90
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	1	1.30	1.30	0.01	1.32	1.32	0.01	0.00	1.32
Remove/Replace	40	55.90	1.40	0.28	93.55	2.34	0.46	0.29	93.84
Repair	7	7.60	1.09	0.04	10.95	1.56	0.05	0.00	10.95
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	-	-	-	-	-	-	-	-	-
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/ Assemble	-	-	-	-	-	-	-	-	-
Remove	-	-	-	-	-	-	-	-	-
Modification Work Order	-	-	-	-	-	-	-	-	-
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	6	0.50	0.08	0.00	0.58	0.10	0.00	0.00	0.58
Other	6	2.50	0.42	0.01	4.00	0.67	0.02	0.00	4.00
Totals	77	79.90	1.04*	0.40	133.37	1.73*	0.66	0.62	133.99

*Weighted Average, **Maintenance Man-Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED FOR BOTH SIKORSKY AIRCRAFT S50 AND S52
FOR WHICH THE AIRCRAFT WERE NOT MISSION AVAILABLE DURING OT-II
BASED ON 202.5 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Inspect	15	18.70	1.25	0.09	27.22	1.82	0.13	0.32	27.54
Test	-	-	-	-	-	-	-	-	-
Service	3	0.90	0.30	0.00	2.15	0.72	0.01	0.09	2.16
Adjust	6	7.70	1.28	0.04	14.67	2.45	0.07	0.28	14.95
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	-	-	-	-	-	-	-	-	-
Remove/Replace	41	58.80	1.43	0.29	96.87	2.36	0.48	0.36	97.23
Repair	7	7.60	1.09	0.04	10.95	1.56	0.05	0.00	10.95
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	-	-	-	-	-	-	-	-	-
Operation	-	-	-	-	-	-	-	-	-
Lubricate	-	-	-	-	-	-	-	-	-
Disassemble/ Assemble	1	3.00	3.00	0.02	6.62	6.62	0.03	0.00	6.62
Remove	-	-	-	-	-	-	-	-	-
Modification Work Order	5	1.10	0.22	0.01	1.45	0.29	0.01	14.01	15.46
Cannibalize	-	-	-	-	-	-	-	-	-
Safety Wire	6	0.50	0.08	0.00	0.58	0.10	0.00	0.00	0.58
Other	6	2.50	0.42	0.01	4.00	0.67	0.02	0.00	4.00
Totals	91	102.10	1.12*	0.50	165.84	1.82*	0.82	14.97	180.81

*Weighted Average, **Maintenance Man-Hours Indirect

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APPENDIX 24

MAINTENANCE TRENDS OF THE UTTAS CANDIDATES
DURING DT II

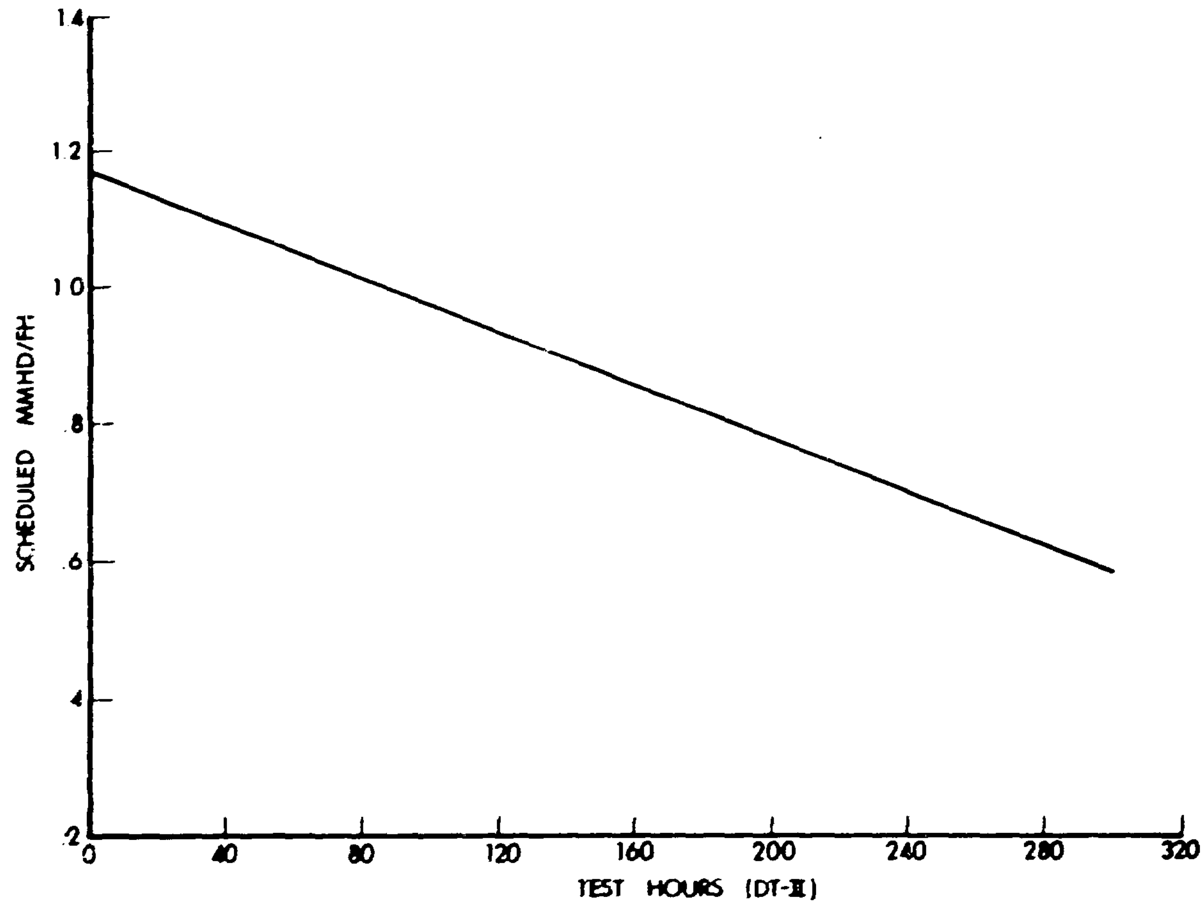

Figure 1. Scheduled Maintenance Man Hours Direct as a Function of Test Time Based on Boeing DT II Results.

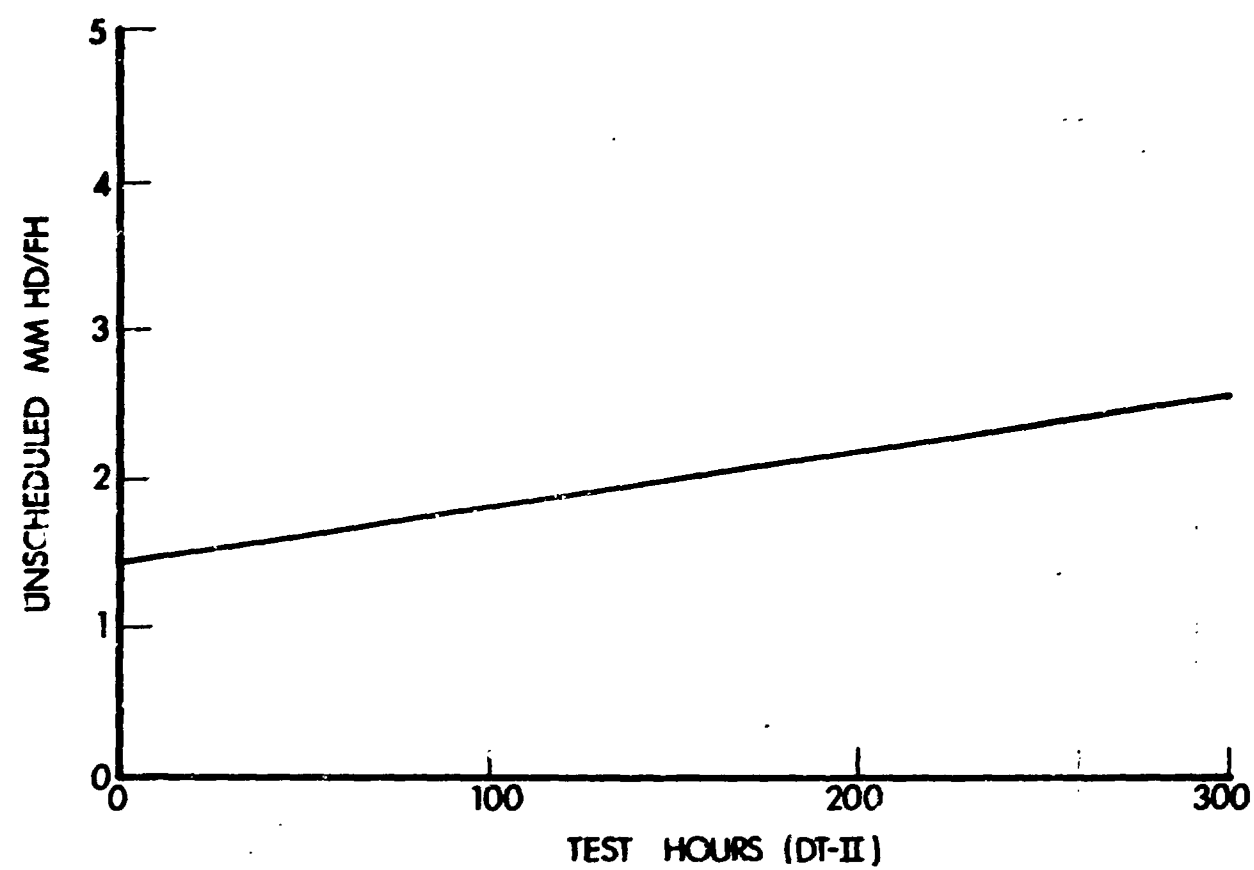

Figure 2. Unscheduled Maintenance Man Hours Direct as a Function of Test Time Based on Boeing DT II Results.

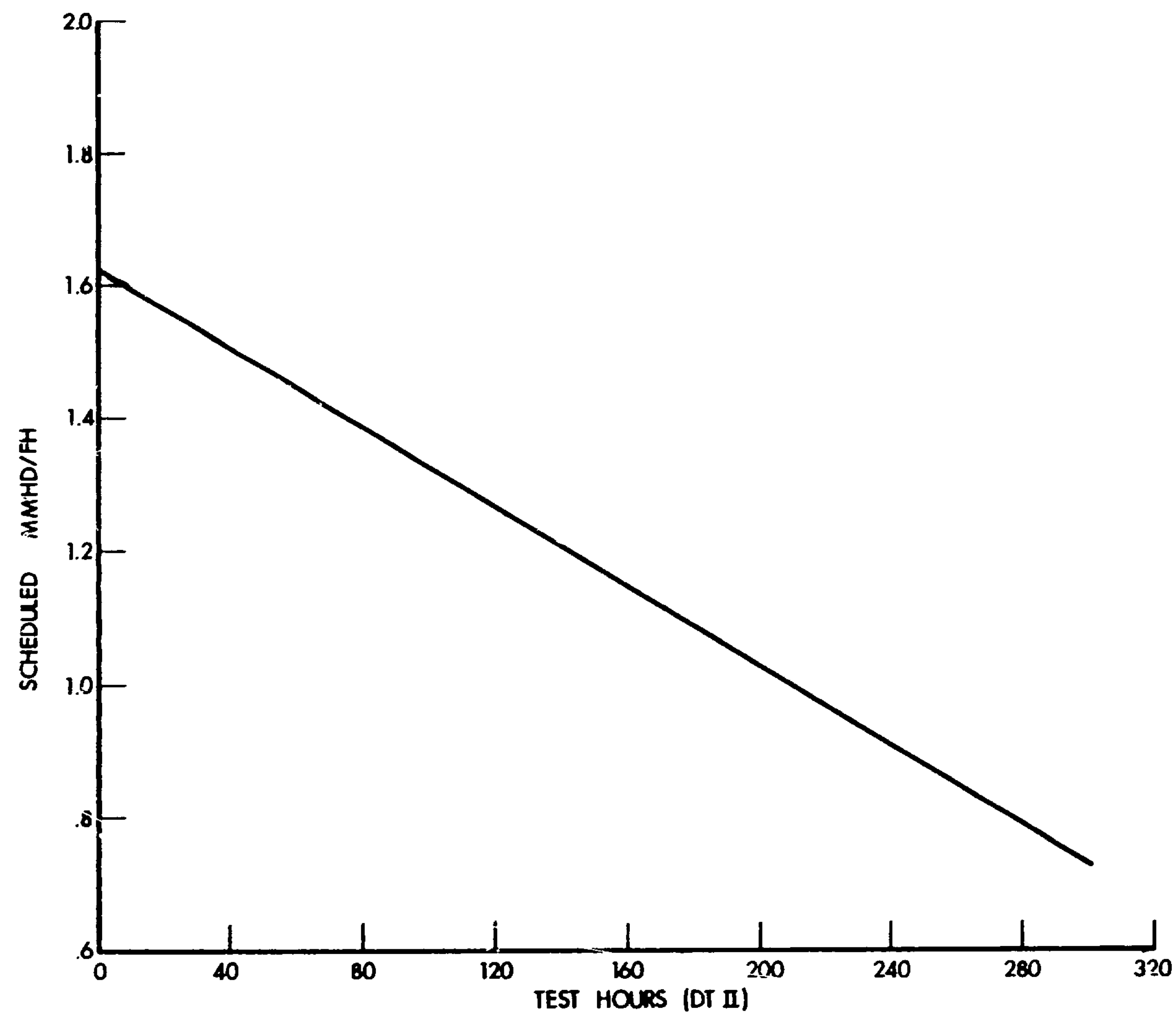

Figure 3. Scheduled Maintenance Man Hours Direct as a Function of Test Time Based on Sikorsky DT-II Results.

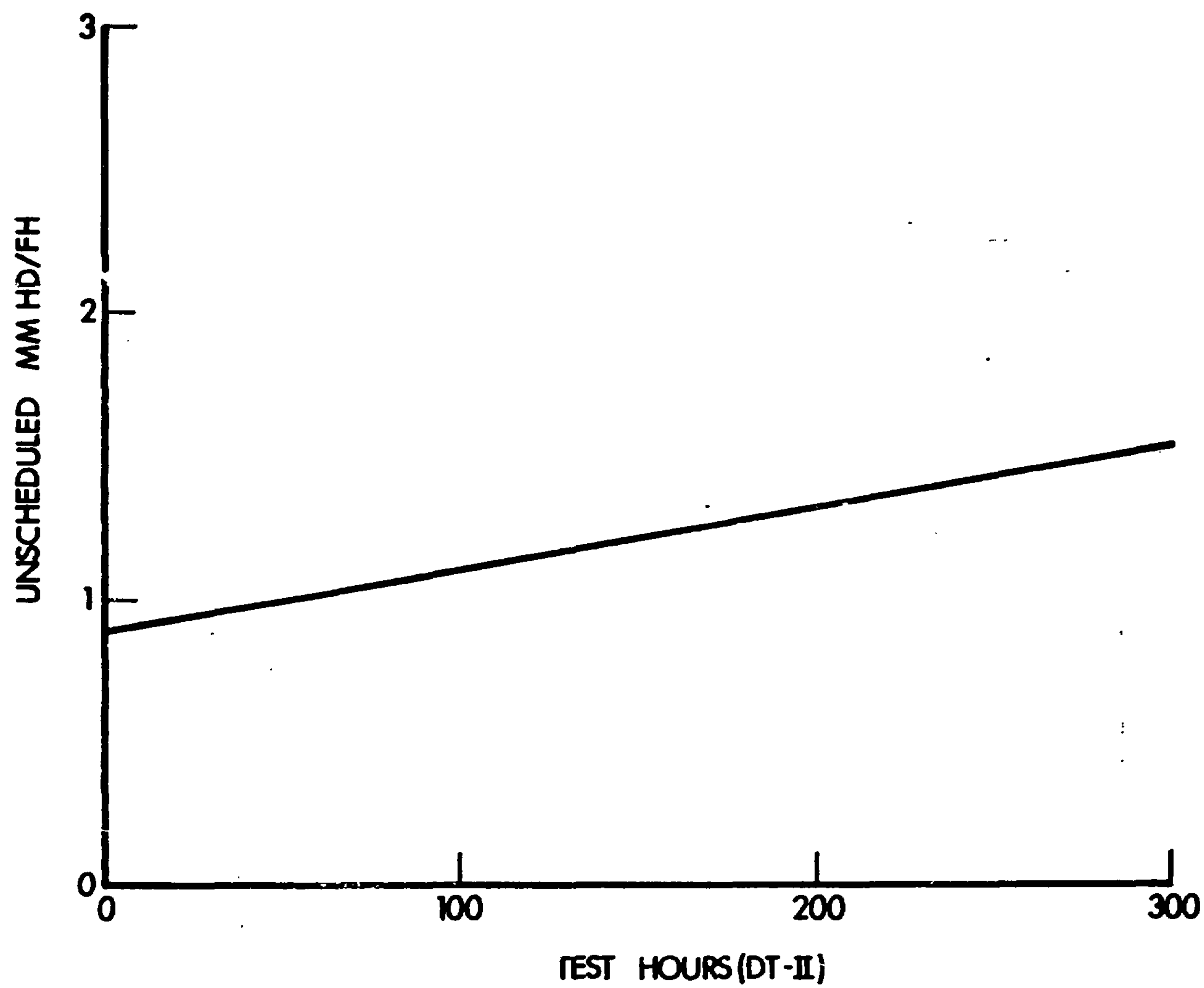

Figure 4. Unscheduled Maintenance Man Hours Direct as a Function of Test Time Based on Sikorsky DT II Results.

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APPENDIX 25

MAINTENANCE TRENDS OF THE UTTAS CANDIDATES DURING OT II

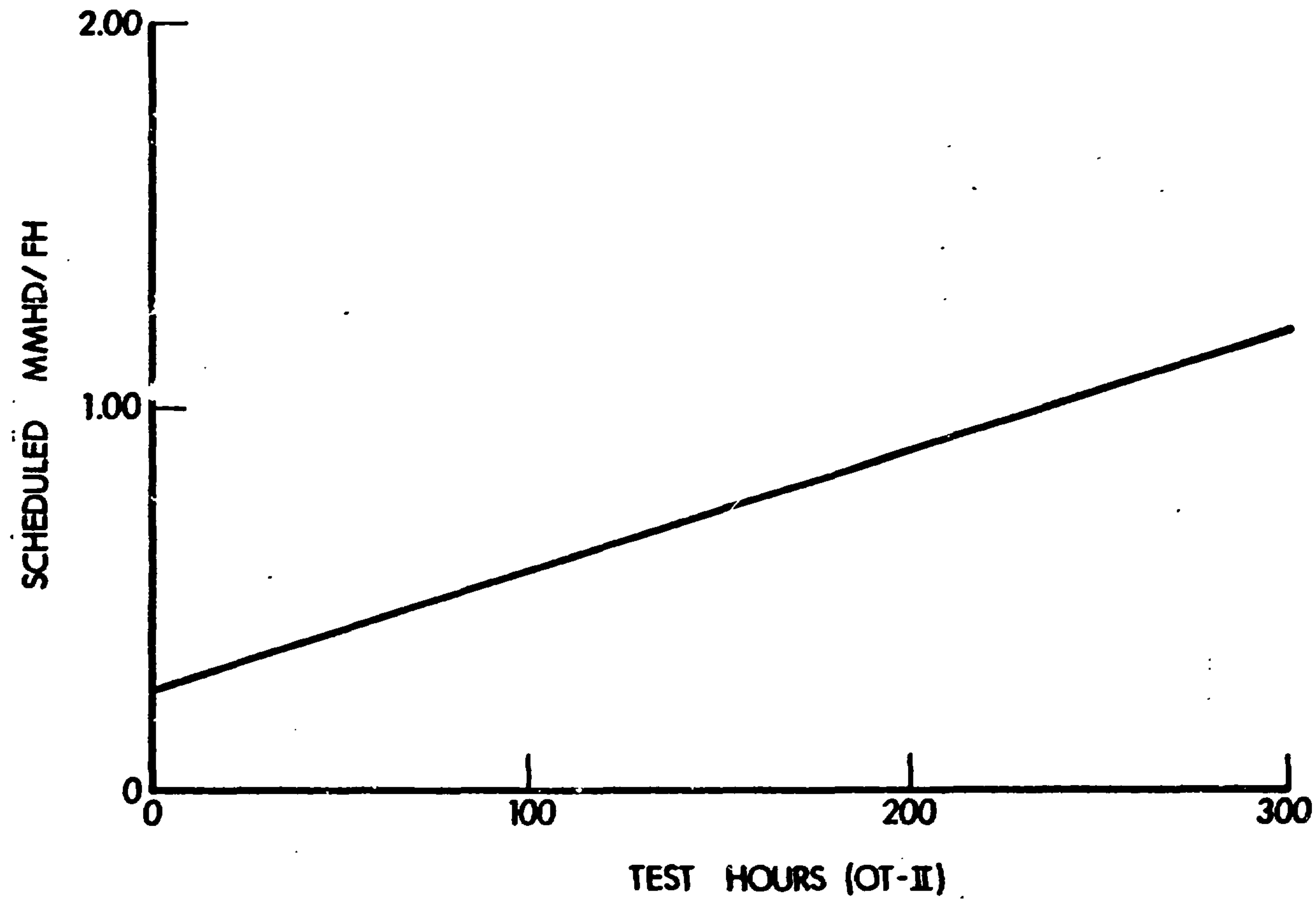

Figure 1. Scheduled Maintenance Man Hours Direct as a Function of Test Time Based on Boeing OT II Results.

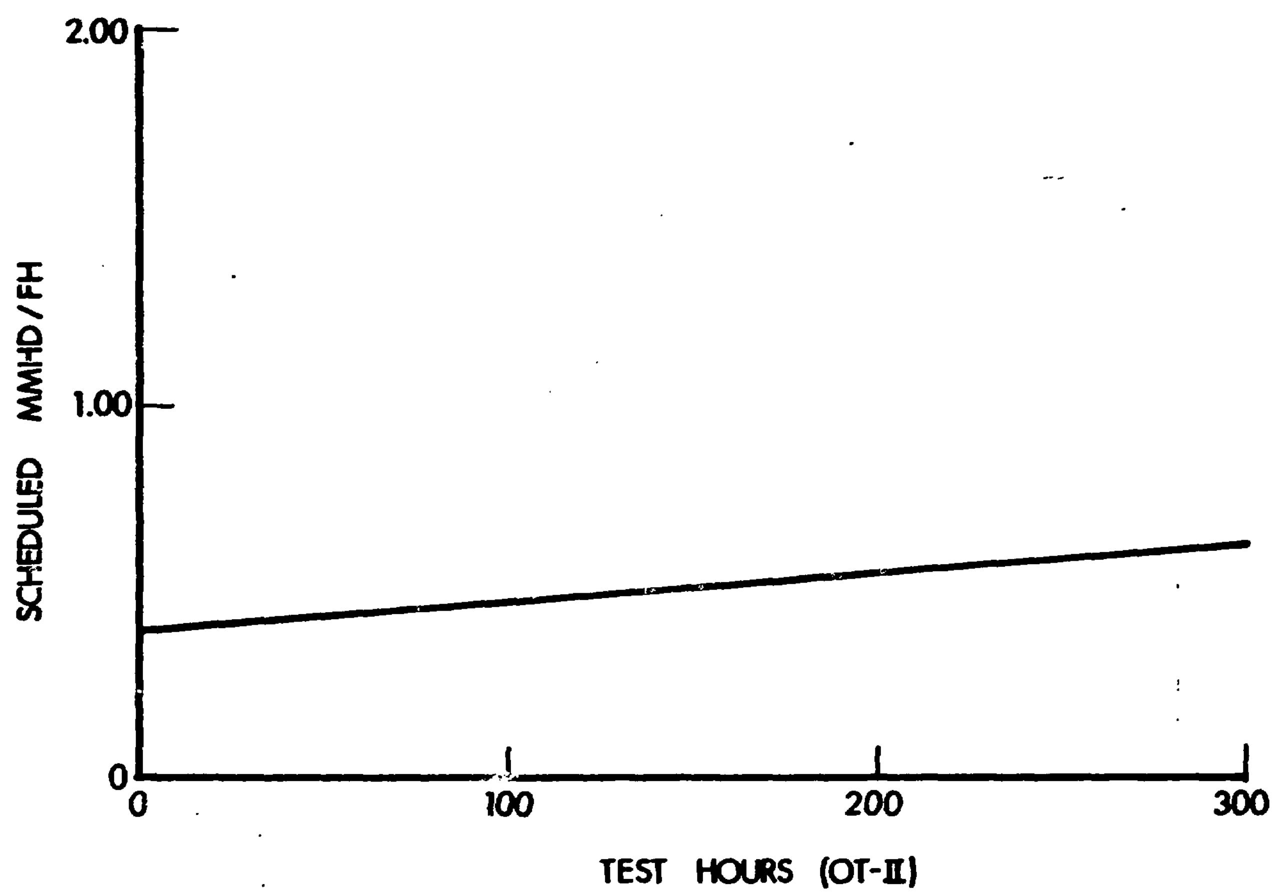

Figure 2. Scheduled Maintenance Man Hours Direct as a Function of Test Time Based on Boeing OT II Test Results with Periodic and Special Inspections Excluded.

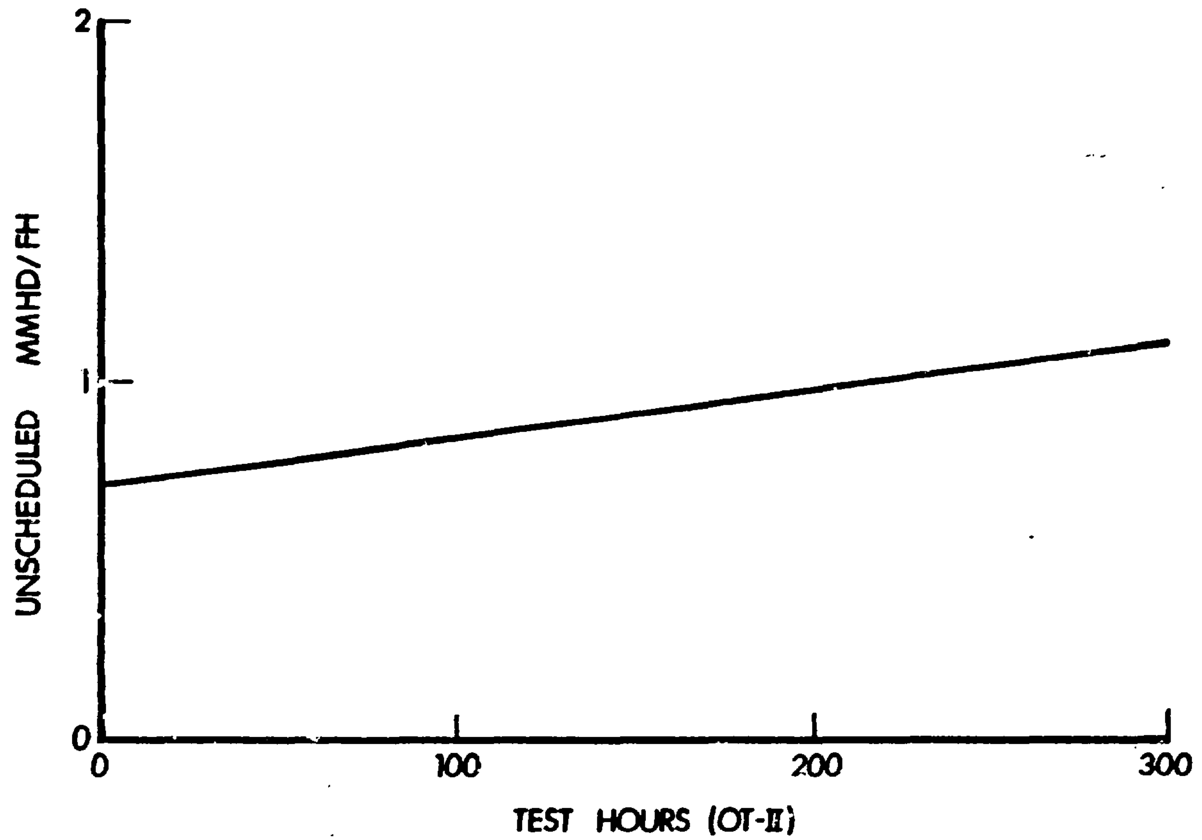

Figure 3. Unscheduled Maintenance Man Hours Direct as a Function of Test Time Based on Boeing OT-II Results.

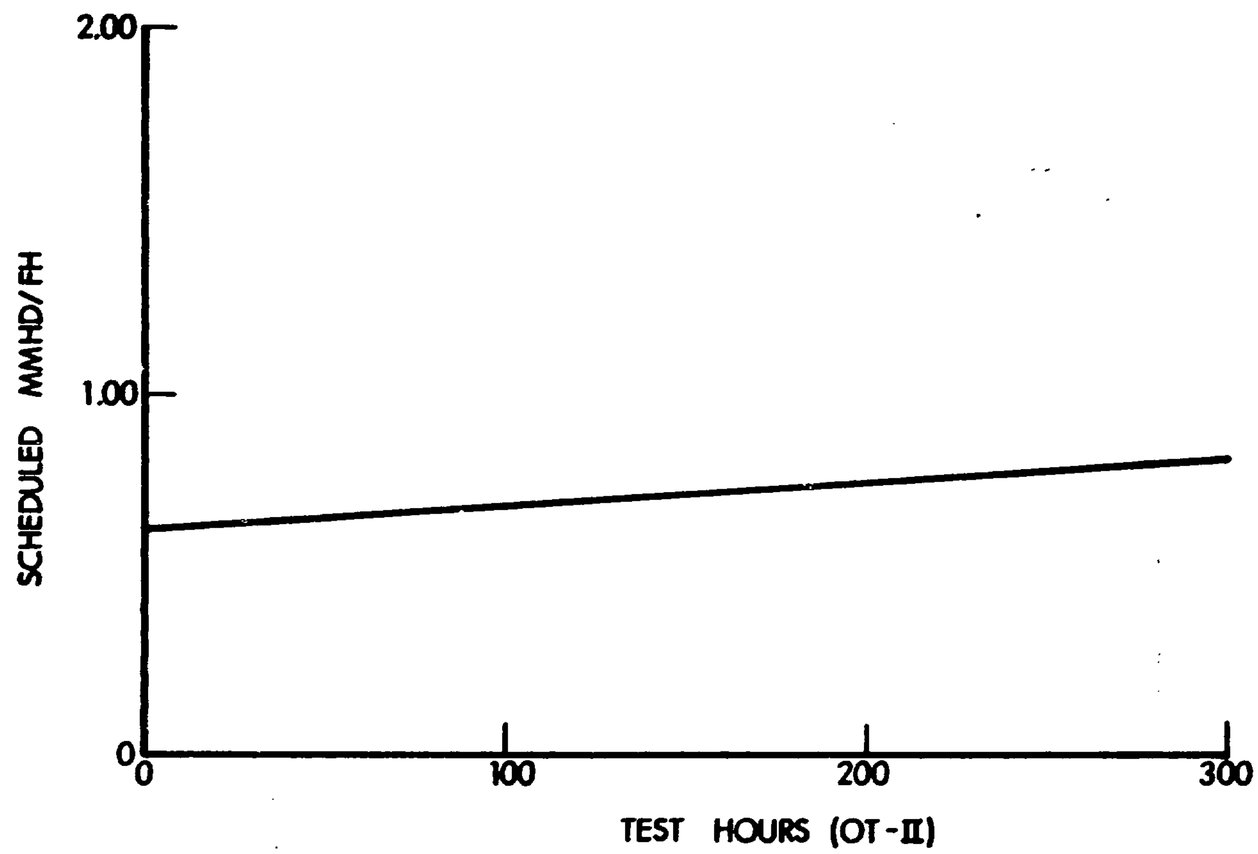

Figure 4. Scheduled Maintenance Man Hours Direct as a Function of Test Time Based on Sikorsky OT II Results.

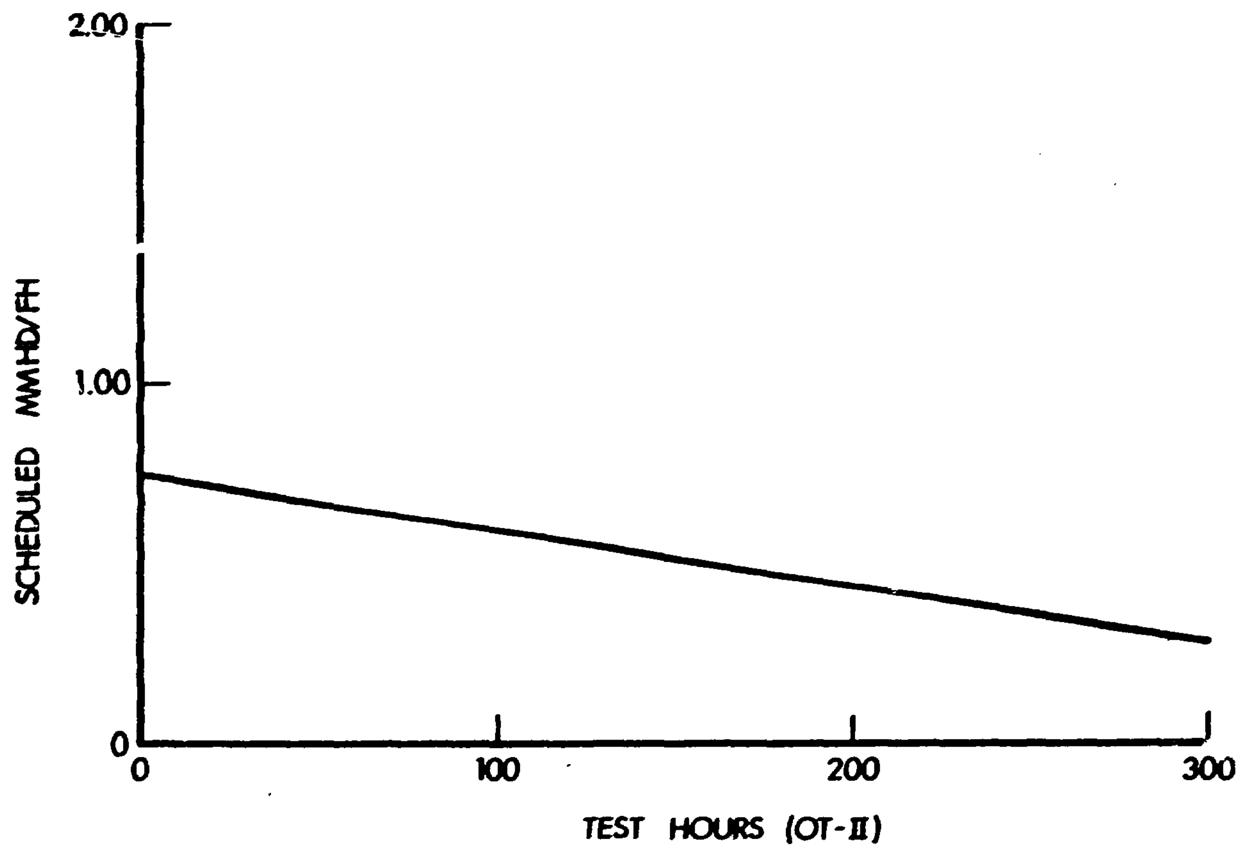

Figure 5. Scheduled Maintenance Man Hours Direct as a Function of Test Time Based on Sikorsky OT-II Test Results with Periodic and Special Inspections Excluded.

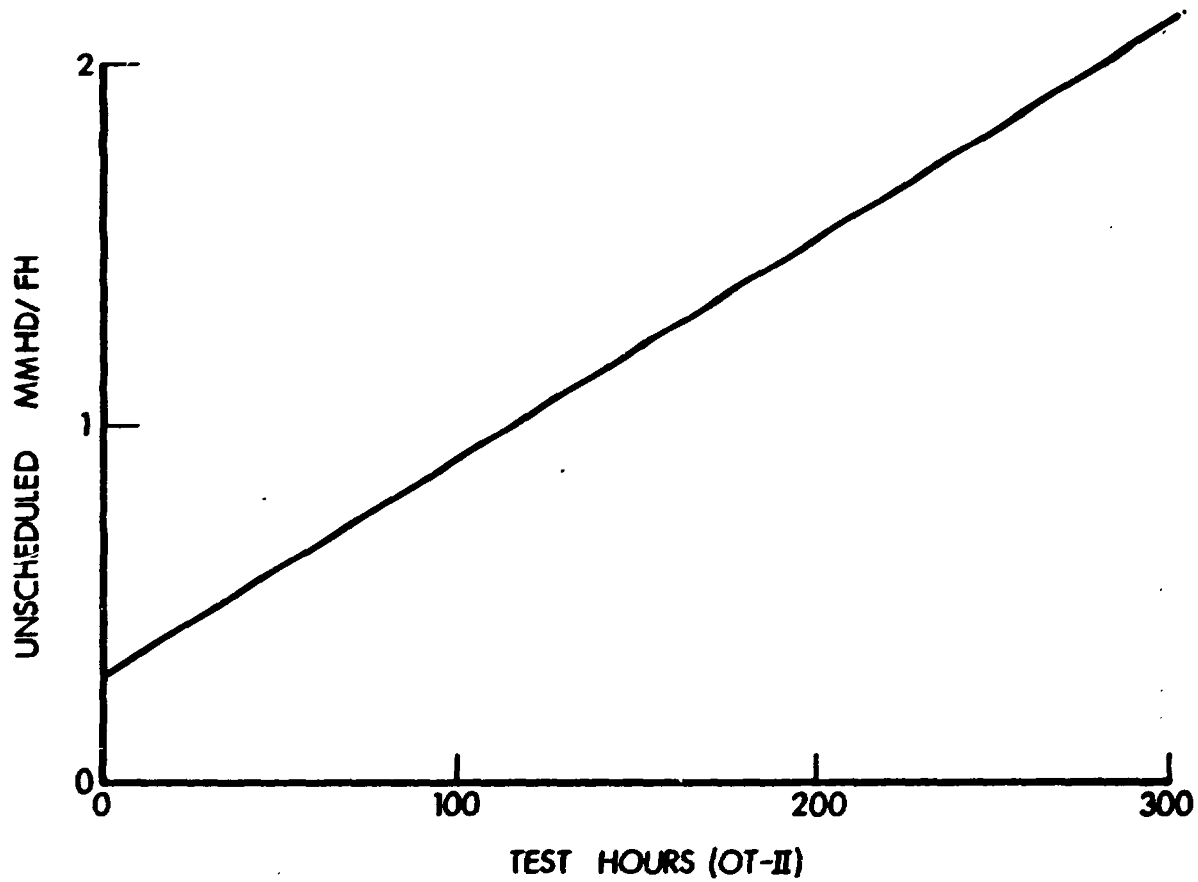

Figure 7. Unscheduled Maintenance Man Hours Direct as a Function of Test Time Based on Sikorsky OT-II Results.

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APPENDIX 26

FAILURE CORRECTIVE MAINTENANCE OF THE BOEING AND SIKORSKY UTTAS CANDIDATES AND THE BELL UH-1H

FAILURE CORRECTIVE MAINTENANCE OF BOTH BOEING AIRCRAFT
V56 AND V57 DURING DT-II BASED ON 311.1 FLIGHT HOURS

Subsystem	Number of System Failures	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			Mean Time Between Failures (MTBF)
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	
Airframe	16	35.90	2.24	0.12	55.63	3.47	0.18	19.44
Landing Gear	1	0.70	0.70	0.00	1.34	1.34	0.00	311.10
Power Plant and Pneumatic System	15	11.60	0.77	0.04	12.15	0.81	0.04	20.74
Drive System	19	53.50	2.82	0.17	108.45	5.71	0.35	16.37
Hydraulic	7	9.90	1.41	0.03	14.09	2.01	0.05	44.44
Instrumentation	7	3.20	0.46	0.00	4.68	0.67	0.02	44.44
Electrical	19	18.40	0.97	0.06	20.54	1.08	0.07	16.37
Fuel	4	12.90	3.23	0.04	18.81	4.70	0.06	77.78
Flight Controls	2	3.60	1.80	0.01	6.28	3.14	0.02	155.55
Utility	1	0.10	0.10	0.00	0.10	0.10	0.00	311.10
Cargo & Personnel Handling Equipment	1	3.60	3.60	0.01	4.27	4.27	0.02	311.10
Auxiliary Power Unit (APU)	7	14.30	2.04	0.05	15.20	2.17	0.05	44.44
Avionics	25	50.30	2.01	0.16	96.18	3.85	0.31	12.44
Armament	-	-	-	-	-	-	-	-
Unspecified	1	0.50	0.50	0.00	0.49	0.49	0.00	311.10
TOTALS	125	218.50	1.75*	0.70	358.21	2.87*	1.15	2.49

*Weighted Average

FAILURE CORRECTIVE MAINTENANCE OF BOTH BOEING AIRCRAFT
V56 AND V57 DURING OT-II BASED ON 199.9 FLIGHT HOURS

Subsystem	Number of System Failures	Actual Clock Maintenance (ACM)			Maintenance Men Hours Direct (MMHD)			Mean Time Between Failures (MTBF)
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	
Airframe	7	11.90	1.70	0.06	13.24	1.89	0.07	28.56
Landing Gear	-	-	-	-	-	-	-	-
Power Plant and Pneumatic System	4	1.10	0.28	0.01	0.99	0.25	0.00	49.98
Drive System	11	15.80	1.26	0.07	20.60	1.87	0.10	18.17
Hydraulic	5	19.20	3.84	0.10	38.93	7.76	0.19	39.98
Instrumentation	4	6.40	1.60	0.03	10.19	2.55	0.05	49.98
Electrical	7	9.40	1.34	0.05	18.71	2.67	0.09	28.56
Fuel	1	1.50	1.50	0.01	1.53	1.53	0.01	199.90
Flight Controls	-	-	-	-	-	-	-	-
Utility	-	-	-	-	-	-	-	-
Cargo & Personnel Handling Equipment	-	-		-	-	-	-	-
Auxiliary Power Unit (APU)	3	2.60	0.87	0.01	3.51	1.17	0.02	66.63
Avionics	6	3.00	0.50	0.02	3.53	0.59	0.02	33.32
Armament	-	-	-	-	-	-	-	-
Unspecified	1	4.30	4.30	0.02	7.72	7.72	0.04	199.90
TOTALS	49	73.20	1.49*	0.37	118.95	2.43*	0.60	4.08

*Weighted Average

FAILURE CORRECTIVE MAINTENANCE OF BOTH SIKORSKY AIRCRAFT
S50 AND S52 DURING DT-II BASED ON 304.6 FLIGHT HOURS

Subsystem	Number of System Failures	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			Mean Time Between Failures (MTBF)
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	
Airframe	16	13.10	0.82	0.04	20.86	1.30	0.07	19.04
Landing Gear	4	2.10	0.53	0.01	2.71	0.68	0.01	76.15
Power Plant and Pneumatic System	17	21.00	1.24	0.07	27.75	1.63	0.09	17.92
Drive System	25	27.10	1.08	0.09	36.85	1.47	0.12	12.18
Hydraulic	8	12.60	1.58	0.04	18.43	2.30	0.06	38.08
Instrumentation	3	0.20	0.07	0.00	0.20	0.07	0.00	101.53
Electrical	25	14.70	0.59	0.05	19.29	0.77	0.06	12.18
Fuel	3	1.10	0.37	0.00	1.38	0.46	0.00	101.53
Flight Controls	15	41.80	2.79	0.14	59.20	3.95	0.19	20.31
Utility	1	0.00	0.00	0.00	0.04	0.04	0.00	304.60
Cargo & Personnel Handling Equipment	3	0.40	0.13	0.00	0.35	0.12	0.00	101.53
Auxiliary Power Unit (APU)	-	-	-		-	-	-	-
Avionics	6	3.80	0.63	0.01	5.04	0.84	0.02	50.77
Armament	-	-	-	-	-	-	-	-
Unspecified	2	6.00	3.00	0.02	13.09	6.55	0.04	152.30
TOTALS	128	143.90	1.12*	0.47	205.19	1.60*	0.67	2.38

*Weighted Average

FAILURE CORRECTIVE MAINTENANCE OF BOTH SIKORSKY AIRCRAFT
S50 AND S52 DURING OT-II BASED ON 202.5 FLIGHT HOURS

Subsystem	Number of System Failures	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			Mean Time Between Failures (MTBF)
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	
Airframe	8	8.90	1.11	0.05	16.37	2.05	0.08	25.31
Landing Gear	-	-	-	-	-	-	-	-
Power Plant and Pneumatic System	7	7.80	1.11	0.04	9.18	1.31	0.05	28.93
Drive System	15	12.60	0.84	0.06	23.42	1.56	0.12	13.50
Hydraulic	2	0.70	0.35	0.00	0.72	0.36	0.00	101.25
Instrumentation	1	0.20	0.20	0.00	0.20	0.20	0.00	202.50
Electrical	11	3.50	0.32	0.02	4.01	0.37	0.02	18.41
Fuel	1	0.60	0.60	0.00	0.57	0.57	0.00	202.50
Flight Controls	5	23.80	4.76	0.12	49.57	9.91	0.25	40.50
Utility	2	1.50	0.75	0.01	1.49	0.75	0.01	101.25
Cargo & Personnel Handling Equipment	4	0.40	0.10	0.00	0.37	0.09	0.00	50.63
Auxiliary Power Unit (APU)	-	-	-	-	-	-	-	-
Avionics	5	2.10	0.42	0.01	2.74	0.55	0.01	40.50
Armament	-	-	-	-	-	-	-	-
Unspecified	1	0.60	0.60	0.00	1.28	1.28	0.01	202.50
TOTALS	62	62.70	1.01*	0.31	109.92	1.77*	0.55	3.27

*Weighted Average

FAILURE CORRECTIVE MAINTENANCE OF THE BELL UH-1H BASED ON 611.5 FLIGHT HOURS

Subsystem	Number of System Failures	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			Mean Time Between Failures (MTBF)
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	
Airframe	52	35.70	0.69	0.06	48.57	0.93	0.08	11.80
Landing Gear	2	4.70	2.35	0.01	4.96	2.48	0.01	305.70
Power Plant and Pneumatic System	33	27.10	0.82	0.04	31.93	0.97	0.05	18.50
Drive System	66	58.90	0.89	0.10	92.43	1.40	0.15	9.30
Hydraulic	7	3.80	0.54	0.01	5.26	0.75	0.01	87.40
Instrumentation	11	2.90	0.26	0.00	3.51	0.32	0.01	55.60
Electrical	31	14.70	0.47	0.02	26.13	0.84	0.04	19.70
Fuel	5	1.30	0.26	0.00	1.30	0.26	0.00	122.30
Flight Controls	30	25.10	0.84	0.04	36.47	1.22	0.06	20.40
Utility	4	1.70	0.42	0.00	1.69	0.42	0.00	152.90
Cargo & Personnel Handling Equipment	2	0.70	0.35	0.00	0.72	0.36	0.00	305.70
Auxiliary Power Unit (APU)	-	-	-	-	-	-	-	-
Avionics	23	6.90	0.30	0.01	9.27	0.40	0.02	26.60
Armament	-	-	-	-	-	-	-	-
Unspecified	13	8.20	0.63	0.01	11.31	0.87	0.02	47.00
TOTALS	279	191.70	0.69*	0.31	273.55	0.98*	0.45	2.19

*Weighted Average

APPENDIX 27

SCHEDULED AND UNSCHEDULED MAINTENANCE OF THE BELL UH-1H CATEGORIZED BY SUBSYSTEM

SCHEDULED MAINTENANCE OF THE BELL UH-1H BASED ON 611.5 FLIGHT HOURS

		Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
Subsystem	Number of Events	ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Airframe	36	26.60	0.74	0.04	32.34	0.90	0.05	0.00	32.34
Landing Gear	-	-	-	-	-	-	-	-	-
Power Plant and Pneumatic System	56	30.50	0.54	0.05	35.46	0.63	0.06	0.23	35.69
Drive System	100	79.00	0.79	0.13	124.64	1.25	0.20	0.00	124.64
Hydraulic	7	2.40	0.34	0.00	2.54	0.36	0.00	0.00	2.54
Instrumentation	8	3.20	0.40	0.00	4.71	0.59	0.01	0.00	4.71
Electrical	13	5.60	0.43	0.01	5.54	0.43	0.01	0.50	6.04
Fuel	3	1.80	0.60	0.00	1.87	0.62	0.00	0.00	1.87
Flight Controls	12	7.80	0.65	0.01	13.08	1.09	0.02	0.00	13.08
Utility	8	0.80	0.10	0.00	0.76	0.10	0.00	0.00	0.76
Cargo & Personnel Handling Equipment	5	3.00	0.60	0.00	6.94	1.39	0.01	0.00	6.94
Auxiliary Power Unit (APU)	-	-	-	-	-	-	-	-	-
Avionics	7	3.30	0.47	0.00	3.65	0.52	0.01	0.00	3.65
Armament	-	-	-	-	-	-	-	-	-
Unspecified	726	350.70	0.48	0.57	523.73	0.72	0.86	11.83	535.56
TOTALS	981	514.70	0.52 *	0.84	755.26	0.77 *	1.24	12.56	767.82

*Weighted Average
**Maintenance Man Hours Indirect

UNSCHEDULED MAINTENANCE OF THE BELL UH-1H BASED ON 611.5 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			** MMHI	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	117	61.00	0.52	0.10	86.63	0.74	0.14	0.25	86.88
Landing Gear	5	6.60	1.32	0.01	10.74	2.15	0.02	0.00	10.74
Power Plant and Pneumatic System	71	41.40	0.58	0.07	47.00	0.66	0.08	0.00	47.00
Drive System	165	108.70	0.66	0.18	186.28	1.13	0.30	0.00	186.28
Hydraulic	15	5.80	0.39	0.01	8.30	0.55	0.01	0.00	8.30
Instrumentation	23	5.80	0.75	0.01	6.39	0.28	0.01	0.00	6.39
Electrical	51	23.20	0.46	0.04	37.52	0.74	0.06	0.00	37.52
Fuel	16	9.90	0.62	0.02	14.24	0.89	0.02	0.00	14.24
Flight Controls	60	47.10	0.78	0.08	72.56	1.21	0.12	0.42	72.98
Utility	6	2.10	0.35	0.00	2.07	0.34	0.00	0.00	2.07
Cargo & Personnel Handling Equipment	4	2.00	0.50	0.00	3.58	0.90	0.01	0.00	3.58
Auxiliary Power Unit (APU)	-	-	-	-	-	-	-	-	-
Avionics	36	13.70	0.38	0.02	16.91	0.47	0.03	0.00	16.91
Armament	-	-	-	-	-	-	-	-	-
Unspecified	55	32.30	0.59	0.05	38.28	0.70	0.06	0.00	38.28
TOTALS	624	359.60	0.58	0.59*	530.50	0.85*	0.87	0.67	531.17

*Weighted Average
**Maintenance Man Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED OF THE BELL UH-1H BASED ON 611.5 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	153	87.60	0.57	0.14	118.97	0.78	0.20	0.25	119.22
Landing Gear	5	6.60	1.32	0.01	10.74	2.15	0.02	0.00	10.74
Power Plant and Pneumatic System	127	71.90	0.57	0.12	82.46	0.65	0.14	0.23	82.69
Drive System	265	187.70	0.71	0.31	310.92	1.17	0.51	0.00	310.92
Hydraulic	22	8.20	0.37	0.01	10.84	0.49	0.02	0.00	10.84
Instrumentation	31	9.00	0.29	0.02	11.10	0.36	0.02	0.00	11.10
Electrical	64	28.80	0.45	0.05	43.06	0.67	0.07	0.50	43.56
Fuel	19	11.70	0.62	0.02	16.11	0.85	0.03	0.00	16.11
Flight Controls	72	54.90	0.76	0.09	85.64	1.19	0.14	0.42	86.06
Utility	14	2.90	0.21	0.00	2.83	0.20	0.00	0.00	2.83
Cargo & Personnel Handling Equipment	9	5.00	0.56	0.01	10.52	1.17	0.02	0.00	10.52
Auxiliary Power Unit (APU)	-	-	-	-	-	-	-	-	-
Avionics	43	17.00	0.40	0.03	20.56	0.48	0.03	0.00	20.56
Armament	-	-	-	-	-	-	-	-	-
Unspecified	781	383.00	0.49	0.63	562.01	0.72	0.92	11.83	573.84
TOTALS	1505	874.30	0.54*	1.43	1285.76	0.80*	2.10	13.23	1298.99

*Weighted Average
**Maintenance Man Hours Indirect

SCHEDULED MAINTENANCE OF THE BELL UH-1H FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE BASED ON 611.5 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			MMHI**	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	26	23.90	0.92	0.04	26.48	1.02	0.04	0.00	26.48
Landing Gear	-	-	-	-	-	-	-	-	-
Power Plant and Pneumatic System	44	25.60	0.58	0.04	28.02	0.64	0.05	0.23	28.25
Drive System	78	71.20	0.91	0.12	116.67	1.50	0.19	0.00	116.67
Hydraulic	7	2.40	0.34	0.00	2.54	0.36	0.00	0.00	2.54
Instrumentation	5	1.80	0.36	0.00	1.60	0.32	0.00	0.00	1.60
Electrical	11	5.40	0.49	0.01	5.36	0.49	0.01	0.42	5.78
Fuel	3	1.80	0.60	0.00	1.87	0.62	0.00	0.00	1.87
Flight Controls	11	7.50	0.68	0.01	12.74	1.16	0.02	0.00	12.74
Utility	6	0.70	0.12	0.00	0.66	0.11	0.00	0.00	0.66
Cargo & Personnel Handling Equipment	5	3.00	0.60	0.00	6.94	1.39	0.01	0.00	6.94
Auxiliary Power Unit (APU)	-	-	-	-	-	-	-	-	-
Avionics	4	1.80	0.45	0.00	1.81	0.45	0.00	0.00	1.81
Armament	-	-	-	-	-	-	-	-	-
Unspecified	83	81.40	0.98	0.13	101.39	1.22	0.17	1.59	102.98
TOTALS	283	226.50	0.80*	0.37	306.08	1.08*	0.50	2.24	308.32

*Weighted Average
**Maintenance Man Hours Indirect

UNSCHEDULED MAINTENANCE OF THE BELL UH-1H FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE BASED ON 611.5 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			** MMHI	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	87	47.50	0.54	0.08	67.65	0.78	0.11	0.17	67.82
Landing Gear	5	6.60	1.32	0.01	10.74	2.15	0.02	0.00	10.74
Power Plant and Pneumatic System	53	35.00	0.66	0.06	40.04	0.76	0.06	0.00	40.04
Drive System	128	97.20	0.76	0.16	165.39	1.29	0.27	0.00	165.39
Hydraulic	12	4.40	0.37	0.01	6.08	0.51	0.01	0.00	6.08
Instrumentation	14	4.00	0.29	0.01	4.19	0.30	0.01	0.00	4.19
Electrical	19	15.90	0.84	0.03	29.81	1.57	0.05	0.00	29.81
Fuel	12	9.20	0.77	0.02	13.66	1.14	0.02	0.00	13.66
Flight Controls	45	38.10	0.85	0.06	59.57	1.32	0.10	0.25	59.82
Utility	3	1.70	0.57	0.00	1.71	0.57	0.00	0.00	1.71
Cargo & Personnel Handling Equipment	2	1.30	0.65	0.00	2.86	1.43	0.00	0.00	2.86
Auxiliary Power Unit (APU)	-	-	-	-	-	-	-	-	-
Avionics	17	10.00	0.59	0.02	13.08	0.77	0.02	0.00	13.08
Armament	-	-	-	-	-	-	-	-	-
Unspecified	35	28.10	0.80	0.05	32.82	0.94	0.05	0.00	32.82
TOTALS	432	298.80	0.69 *	0.49	447.60	1.04*	0.73	0.42	448.02

*Weighted Average
**Maintenance Man Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED OF THE BELL UH-1H FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE BASED ON 611.5 FLIGHT HOURS

Subsystem	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)			** MMHI	MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour		
Airframe	113	71.20	0.63	0.12	94.13	0.83	0.15	0.17	94.30
Landing Gear	5	6.60	1.32	0.01	10.74	2.15	0.02	0.00	10.74
Power Plant and Pneumatic System	97	60.60	0.62	0.10	68.06	0.70	0.11	0.23	68.29
Drive System	206	168.40	0.82	0.28	282.06	1.37	0.46	0.00	282.06
Hydraulic	19	6.80	0.36	0.01	8.62	0.45	0.01	0.00	8.62
Instrumentation	19	5.80	0.30	0.01	5.79	0.30	0.01	0.00	5.79
Electrical	30	21.30	0.71	0.04	35.17	1.17	0.06	0.42	35.59
Fuel	15	11.00	0.73	0.02	15.53	1.04	0.02	0.00	15.53
Flight Controls	56	45.60	0.81	0.08	72.31	1.29	0.12	0.25	72.56
Utility	9	2.40	0.27	0.00	2.37	0.26	0.00	0.00	2.37
Cargo & Personnel Handling Equipment	7	4.30	0.61	0.01	9.80	1.40	0.02	0.00	9.80
Auxiliary Power Unit (APU)	-	-	-	-	-	-	-	-	-
Avionics	21	11.80	0.56	0.02	14.89	0.71	0.02	0.00	14.89
Armament	-	-	-	-	-	-	-	-	-
Unspecified	118	109.50	0.93	0.18	134.21	1.14	0.22	1.59	135.80
TOTALS	715	525.30	0.74*	0.86	753.68	1.05*	1.23	2.66	756.34

*Weighted Average
**Maintenance Man Hours Indirect

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APPENDIX 28

SCHEDULED AND UNSCHEDULED MAINTENANCE OF THE BELL UH-1H CATEGORIZED BY MAINTENANCE FUNCTION

SCHEDULED MAINTENANCE OF THE BELL UH-1H BASED ON 611.5 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM): ACM	ACM Per Event	ACM Per Flight Hour	Maintenance Man Hours Direct (MMHD): MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Inspect	740	340.30	0.46	0.56	502.39	0.68	0.82	11.49	513.88
Test	17	4.80	0.28	0.01	5.44	0.32	0.01	0.42	5.86
Service	84	54.70	0.65	0.09	65.78	0.78	0.11	0.18	65.96
Adjust	10	7.50	0.75	0.01	8.98	0.90	0.02	0.00	8.98
Align	-	-	-	-	-	-	-	-	-
Calibrate	1	0.40	0.40	0.00	1.29	1.29	0.00	0.00	1.29
Install	14	8.60	0.61	0.01	14.94	1.07	0.02	0.00	14.94
Remove/Replace	40	36.30	0.91	0.06	51.88	1.30	0.08	0.47	52.35
Repair	1	0.70	0.70	0.00	0.72	0.72	0.00	0.00	0.72
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	-	-	-	-	-	-	-	-	-
Operation	-	-	-	-	-	-	-	-	-
Lubricate	5	3.00	0.60	0.00	3.17	0.63	0.00	0.00	3.17
Disassemble/ Assemble	31	39.60	1.28	0.06	70.38	2.27	0.12	0.00	70.38
Remove	28	13.00	0.46	0.02	23.97	0.86	0.04	0.00	23.97
Modification Work Order	2	0.50	0.25	0.00	1.00	0.50	0.00	0.00	1.00
Cannibalize	1	0.30	0.30	0.00	0.25	0.25	0.00	0.00	0.25
Safety Wire	7	4.70	0.67	0.01	4.66	0.67	0.01	0.00	4.66
Other	2	0.80	0.40	0.00	1.41	0.70	0.00	0.00	1.41
Totals	983	515.20	0.52*	0.84	756.26	0.77*	1.24	12.56	768.82

* Weighted Average
** Maintenance Man-Hours Indirect

UNSCHEDULED MAINTENANCE OF THE BELL UH-1H BASED ON 611.5 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Inspect	65	22.60	0.35	0.04	27.18	0.42	0.04	0.25	27.43
Test	10	2.70	0.27	0.00	4.36	0.44	0.01	0.00	4.36
Service	37	18.90	0.51	0.03	29.20	0.79	0.05	0.09	29.20
Adjust	104	48.10	0.46	0.08	67.48	0.65	0.11	0.00	67.48
Align	2	1.20	0.60	0.00	1.21	0.60	0.00	0.00	1.21
Calibrate	-	-	-	-	-	-	-	-	-
Install	58	18.00	0.31	0.03	28.63	0.49	0.05	0.06	28.63
Remove/Replace	208	137.60	0.66	0.22	202.72	0.98	0.33	0.42	203.14
Repair	47	30.60	0.65	0.05	44.83	0.95	0.07	0.00	44.83
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	1	1.10	1.10	0.00	1.08	1.08	0.00	0.00	1.08
Mission Profile Change	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fault Location	1	0.30	0.30	0.00	0.50	0.50	0.00	0.00	0.50
Operation	-	-	-	-	-	-	-	-	-
Lubricate	4	0.40	0.10	0.00	0.37	0.09	0.00	0.00	0.37
Disassemble/ Assemble	43	56.70	1.32	0.09	92.47	2.15	0.15	0.00	92.47
Remove	15	12.30	0.82	0.02	18.98	1.26	0.03	0.00	18.98
Modification Work Order	1	0.30	0.30	0.00	0.33	0.33	0.00	0.00	0.33
Cannibalize	7	3.40	0.49	0.01	6.16	0.88	0.01	0.00	6.16
Safety Wire	19	4.80	0.25	0.01	4.48	0.24	0.01	0.00	4.48
Other	3	0.90	0.30	0.00	0.85	0.28	0.00	0.00	0.85
TOTALS	626	359.90	0.58*	0.59	530.83	0.85*	0.87	0.67	531.50

*Weighted Average
**Maintenance Man-Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED OF THE BELL UH-1H BASED ON 611.5 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Inspect	805	362.90	0.45	0.59	529.57	0.66	0.87	11.74	541.31
Test	27	7.50	0.28	0.01	9.80	0.36	0.02	0.42	10.22
Service	121	73.60	0.61	0.12	94.98	0.78	0.16	0.18	95.16
Adjust	114	55.60	0.49	0.09	76.46	0.67	0.12	0.00	76.46
Align	2	1.20	0.60	0.00	1.21	0.60	0.00	0.00	1.21
Calibrate	1	0.40	0.40	0.00	1.29	1.29	0.00	0.00	1.29
Install	72	26.60	0.37	0.04	43.57	0.60	0.07	0.00	43.57
Remove/Replace	248	173.90	0.70	0.28	254.60	1.03	0.42	0.89	255.49
Repair	48	31.30	0.65	0.05	45.55	0.95	0.07	0.00	45.55
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	1	1.10	1.10	0.00	1.08	1.08	0.00	0.00	1.08
Mission Profile Change	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fault Location	1	0.30	0.30	0.00	0.50	0.50	0.00	0.00	0.50
Operation	-	-	-	-	-	-	-	-	-
Lubricate	9	3.40	0.38	0.01	3.54	0.39	0.01	0.00	3.54
Disassemble/ Assemble	74	96.30	1.30	0.16	162.85	2.20	0.27	0.00	162.85
Remove	43	25.30	0.59	0.04	42.95	1.00	0.07	0.00	42.95
Modification Work Order	3	0.80	0.27	0.00	1.33	0.44	0.00	0.00	1.33
Cannibalize	8	3.70	0.46	0.01	6.41	0.80	0.01	0.00	6.41
Safety Wire	26	9.50	0.36	0.02	9.14	0.35	0.02	0.00	9.14
Other	5	1.70	0.34	0.00	2.26	0.45	0.00	0.00	2.26
Totals	1609	875.10	0.54 **	1.43	1287.09	0.80**	2.10	13.23	1300.32

*Weighted Average
**Maintenance Man-Hours Indirect

SCHEDULED MAINTENANCE OF THE BELL UH-1H FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE BASED ON 611.5 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Inspect	90	73.20	0.81	0.12	80.86	0.90	0.13	1.17	82.03
Test	8	4.00	0.50	0.01	4.33	0.54	0.01	0.42	4.75
Service	55	42.60	0.78	0.07	50.90	0.92	0.08	0.18	51.08
Adjust	7	3.70	0.53	0.01	4.07	0.58	0.01	0.00	4.07
Align	-	-	-	-	-	-	-	-	-
Calibrate	-	-	-	-	-	-	-	-	-
Install	13	8.20	0.63	0.01	14.18	1.09	0.02	0.00	14.18
Remove/Replace	38	34.50	0.91	0.06	49.65	1.31	0.08	0.47	50.12
Repair	1	0.70	0.70	0.00	0.72	0.72	0.00	0.00	0.72
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	-	-	-	-	-	-	-	-	-
Mission Profile Change	-	-	-	-	-	-	-	-	-
Fault Location	-	-	-	-	-	-	-	-	-
Operation	-	-	-	-	-	-	-	-	-
Lubricate	5	3.00	0.60	0.00	3.17	0.63	0.00	0.00	3.17
Disassemble/Assemble	31	39.60	1.28	0.06	70.38	2.27	0.12	0.00	70.38
Remove	26	11.80	0.45	0.02	22.76	0.88	0.04	0.00	22.76
Modification Work Order	1	0.30	0.30	0.00	0.64	0.64	0.00	0.00	0.64
Cannibalize	1	0.30	0.30	0.00	0.25	0.25	0.00	0.00	0.25
Safety Wire	7	4.70	0.67	0.01	4.66	0.67	0.01	0.00	4.66
Other	1	0.20	0.20	0.00	0.15	0.15	0.00	0.00	0.15
Totals	284	226.80	0.80*	0.37	306.72	1.08**	0.50	2.24	308.96

*Weighted Average
**Maintenance Man-Hours Indirect

UNSCHEDULED MAINTENANCE OF THE BELL UH-1H FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE BASED ON 611.5 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	MMHI**	MMHD plus MMHI
Inspect	27	10.60	0.39	0.02	14.61	0.54	0.02	0.25	14.86
Test	2	0.40	0.20	0.00	0.33	0.16	0.00	0.00	0.33
Service	20	14.40	0.72	0.02	18.55	0.93	0.03	0.00	18.55
Adjust	85	41.60	0.49	0.07	58.31	0.69	0.10	0.00	58.31
Align	2	1.20	0.60	0.00	1.21	0.60	0.00	0.00	1.21
Calibrate	-	-	-	-	-	-	-	-	-
Install	36	14.30	0.40	0.02	24.45	0.68	0.04	0.00	24.45
Remove/Replace	139	114.70	0.82	0.19	178.73	1.26	0.29	0.17	174.90
Repair	37	23.50	0.64	0.04	34.32	0.93	0.06	0.00	34.32
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	1	1.10	1.10	0.00	1.08	1.08	0.00	0.00	1.08
Mission Profile Change	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fault Location	-	-	-	-	-	-	-	-	-
Operation	-	-	-	-	-	-	-	-	-
Lubricate	3	0.30	0.10	0.00	0.29	0.10	0.00	0.00	0.29
Disassemble/ Assemble	43	56.70	1.32	0.09	92.47	2.15	0.15	0.00	92.47
Remove	10	11.30	1.13	0.02	16.06	1.61	0.03	0.00	16.06
Modification Work Order	-	-	-	-	-	-	-	-	-
Cannibalize	6	3.10	0.52	0.00	5.91	0.98	0.01	0.00	5.91
Safety Wire	18	4.70	0.26	0.01	4.43	0.25	0.01	0.00	4.43
Other	3	0.90	0.30	0.00	0.85	0.28	0.00	0.00	0.85
Totals	433	298.80	0.69 **	0.49	447.60	1.03 **	0.73	0.42	448.02

*Weighted Average
**Maintenance Man-Hours Indirect

SCHEDULED AND UNSCHEDULED MAINTENANCE COMBINED OF THE BELL UH-1H FOR WHICH THE AIRCRAFT WAS NOT MISSION AVAILABLE BASED ON 611.5 FLIGHT HOURS

Maintenance Function	Number of Events	Actual Clock Maintenance (ACM)			Maintenance Man Hours Direct (MMHD)				MMHD plus MMHI
		ACM	ACM Per Event	ACM Per Flight Hour	MMHD	MMHD Per Event	MMHD Per Flight Hour	** MMHI	
Inspect	117	83.80	0.72	0.14	95.47	0.82	0.16	1.42	96.89
Test	10	4.40	0.44	0.01	4.66	0.47	0.01	0.42	5.08
Service	75	57.00	0.76	0.09	69.45	0.93	0.11	0.18	69.63
Adjust	92	45.30	0.49	0.07	62.38	0.68	0.10	0.00	62.38
Align	2	1.20	0.60	0.00	1.21	0.60	0.00	0.00	1.21
Calibrate	-	-	-	-	-	-	-	-	-
Install	49	22.50	0.46	0.04	38.63	0.79	0.06	0.00	38.63
Remove/Replace	177	149.20	0.84	0.24	224.38	1.27	0.37	0.64	225.02
Repair	38	24.20	0.64	0.04	35.04	0.92	0.06	0.00	35.04
Overhaul	-	-	-	-	-	-	-	-	-
Rebuild	1	1.10	1.10	0.00	1.08	1.08	0.00	0.00	1.08
Mission Profile Change	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fault Location	-	-	-	-	-	-	-	-	-
Operation	-	-	-	-	-	-	-	-	-
Lubricate	8	3.30	0.41	0.00	3.46	0.43	0.01	0.00	3.46
Disassemble/ Assemble	74	96.30	1.30	0.16	162.85	2.20	0.27	0.00	162.85
Remove	36	23.10	0.64	0.04	38.82	1.08	0.06	0.00	38.82
Modification Work Order	1	0.30	0.30	0.00	0.64	0.64	0.00	0.00	0.64
Cannibalize	7	3.40	0.49	0.01	6.16	0.88	0.01	0.00	6.16
Safety Wire	25	9.40	0.38	0.02	9.09	0.36	0.02	0.00	9.09
Other	4	1.10	0.28	0.00	1.00	0.25	0.00	0.00	1.00
Totals	717	525.60	0.73**	0.86	754.32	1.05**	1.23	2.66	756.98

*Weighted Average
**Maintenance Man-Hours Indirect

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APPENDIX 29

REMOVAL TIMES BY SUBSYSTEM

TABLE 1 SUBSYSTEM INHERENT REMOVAL TIMES FOR COMBINED SIKORSKY YUH-60A S50 AND S52 DURING DT/OT II BASED ON 557.0 FLIGHT HOURS

	INHERENT REPLACEMENTS											
	MAJOR ITEMS			MAJOR ITEMS DYNAMIC COMPONENTS			MINOR ITEMS			MINOR ITEMS DYNAMIC COMPONENTS		
SUBSYSTEMS	NO. EVENTS	ACM*, HOURS	MMH**	NO. EVENTS	ACM, HOURS	MMH	NO. EVENTS	ACM, HOURS	MMH	NO. EVENTS	ACM, HOURS	MMH
Airframe	—	—	—	—	—	—	17	13.2	24.32	1	5.9	12.31
Landing Gear	—	—	—	—	—	—	6	3.4	3.65	—	—	—
Powerplant	3	15.6	39.80	2	9.1	23.17	20	13.9	20.5	2	0.4	0.53
Drive System	5	14.0	22.94	5	14.0	22.94	26	16.0	24.34	13	3.7	4.82
Hydraulic	—	—	—	—	—	—	13	14.4	21.19	—	—	—
Pneumatic	7	5.2	7.31	—	—	—	12	9.0	12.60	2	1.6	2.48
Instrumentation	—	—	—	—	—	—	4	0.5	0.50	—	—	—
Electrical	3	2.2	2.63	—	—	—	31	12.5	14.97	—	—	—
Fuel	—	—	—	—	—	—	5	5.5	6.00	—	—	—
Flight Controls	1	4.5	7.89	1	4.5	7.89	22	70.7	122.06	11	24.4	42.49
Utility	—	—	—	—	—	—	3	1.5	1.53	—	—	—
Cargo and Personnel Handling Equipment	—	—	—	—	—	—	5	0.4	0.35	—	—	—
Auxiliary Power Unit	2	9.8	23.93	2	9.8	23.93	1	0.2	0.34	1	0.2	0.34
Avionics	—	—	—	—	—	—	10	9.1	11.36	—	—	—
Armament	—	—	—	—	—	—	—	—	—	—	—	—
TOTAL	21	51.3	104.5	10	37.4	77.93	175	170.3	263.71	30	36.2	62.97

*Actual Clock Maintenance Time

**On Aircraft Maintenance Manhours Including Direct and Indirect

TABLE 2 SUBSYSTEM INDUCED REMOVAL TIMES FOR COMBINED SIKORSKY YUH-60A S50 AND S52 DURING DT/OT II BASED ON 557.0 FLIGHT HOURS

	INDUCED REPLACEMENTS											
	MAJOR ITEMS			MAJOR ITEMS DYNAMIC COMPONENTS			MINOR ITEMS			MINOR ITEMS DYNAMIC COMPONENTS		
SUBSYSTEMS	NO. EVENTS	ACM* HOURS	MMH**	NO. EVENTS	ACM, HOURS	MMH	NO. EVENTS	ACM, HOURS	MMH	NO. EVENTS	ACM, HOURS	MMH
Airframe	—	——	——	—			4	1.1	1.02			
Landing Gear	—	——	——	—			6	3.6	4.17			
Powerplant	1	1.7	2.61				4	1.4	2.17			
Drive System							1	1.3	1.62	1	0.2	0.17
Hydraulic												
Pneumatic												
Instrumentation												
Electrical	1	1.2	1.21				3	1.8	1.84			
Fuel												
Flight Controls												
Utility							1	1.0	0.97			
Cargo and Personnel Handling Equipment												
Auxiliary Power Unit												
Avionics												
Armament												
TOTALS	2	2.9	3.82				19	10.2	11.79	1	0.2	0.17

*Actual Clock Maintenance Time
**On Aircraft Maintenance Manhours Including Direct and Indirect

TABLE 3 SUBSYSTEM INHERENT REMOVAL TIMES FOR COMBINED BOEING YUH-61A V56 AND V57 DURING UT/UT II BASED ON 570.9 FLIGHT HOURS

	INHERENT REPLACEMENTS											
	MAJOR ITEMS			MAJOR ITEMS DYNAMIC COMPONENTS			MINOR ITEMS			MINOR ITEMS DYNAMIC COMPONENTS		
SUBSYSTEMS	NO. EVENTS	ACM* HOURS	MMH**	NO. EVENTS	ACM, HOURS	MMH	NO. EVENTS	ACM, HOURS	MMH	NO. EVENTS	ACM, HOURS	MMH
Airframe	—	—	—	—	—	—	23	19.0	23.10	1	0.1	0.16
Landing Gear	—	—	—	—	—	—	1	0.7	1.34	—	—	—
Powerplant	10	69.2	152.10	8	64.7	143.75	49	27.0	33.95	—	—	—
Drive System	5	30.9	77.68	5	30.9	77.68	23	35.9	53.86	8	14.1	19.67
Hydraulic	2	15.7	31.69	2	15.7	31.69	11	10.0	17.83	1	0.8	0.80
Pneumatic	—	—	—	—	—	—	—	—	—	—	—	—
Instrumentation	—	—	—	—	—	—	9	4.2	5.61	—	—	—
Electrical	—	—	—	—	—	—	19	9.8	9.87	—	—	—
Fuel	—	—	—	—	—	—	3	3.5	3.55	—	—	—
Flight Controls	—	—	—	—	—	—	4	4.6	8.25	2	2.8	4.54
Utility	—	—	—	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	—	—	—	—	—	—	2	3.6	4.29	—	—	—
Auxiliary Power Unit	—	—	—	—	—	—	8	10.0	12.38	—	—	—
Avionics	—	—	—	—	—	—	33	66.3	135.58	—	—	—
Armament	—	—	—	—	—	—	—	—	—	—	—	—
TOTALS	17	115.8	261.47	15	111.3	253.12	162	284.6	309.61	12	17.8	25.17

*Actual Clock Maintenance Time
**On Aircraft Maintenance Manhours Including Direct and Indirect

TABLE 4 SUBSYSTEM INDUCED REMOVAL TIMES FOR COMBINED BOEING V56 AND V57 DURING DT/OT II BASED ON 570.9 FLIGHT HOURS

	INDUCED REPLACEMENTS											
	MAJOR ITEMS			MAJOR ITEMS DYNAMIC COMPONENTS			MINOR ITEMS			MINOR ITEMS DYNAMIC COMPONENTS		
SUBSYSTEMS	NO. EVENTS	ACM* HOURS	MMH**	NO. EVENTS	ACM, HOURS	MMH	NO. EVENTS	ACM, HOURS	MMH	NO. EVENTS	ACM, HOURS	MMH
Airframe	—	—	—	—	—	—	1	1.9	3.50	—	—	—
Landing Gear	—	—	—	—	—	—	—	—	—	—	—	—
Powerplant	1	0.6	0.58	—	—	—	—	—	—	—	—	—
Drive System	2	7.2	14.00	2	7.2	14.00	—	—	—	—	—	—
Hydraulic	1	5.8	11.80	1	5.8	11.80	—	—	—	—	—	—
Pneumatic	—	—	—	—	—	—	—	—	—	—	—	—
Instrumentation	1	0.1	0.14	—	—	—	1	7.2	7.47	1	7.2	7.47
Electrical	—	—	—	—	—	—	—	—	—	—	—	—
Fuel	—	—	—	—	—	—	2	0.1	0.15	—	—	—
Flight Controls	—	—	—	—	—	—	1	1.8	3.50	1	1.8	3.50
Utility	—	—	—	—	—	—	—	—	—	—	—	—
Cargo and Personnel Handling Equipment	—	—	—	—	—	—	—	—	—	—	—	—
Auxiliary Power Unit	1	3.8	4.73	1	3.8	4.73	—	—	—	—	—	—
Avionics	—	—	—	—	—	—	—	—	—	—	—	—
Armament	—	—	—	—	—	—	—	—	—	—	—	—
TOTALS	6	17.5	31.25	4	16.8	30.53	5	11.0	14.62	2	9.0	10.97

*Actual Clock Maintenance Time
**On Aircraft Maintenance Manhours Including Direct and Indirect

TABLE 5 SUBSYSTEM INHERENT REMOVAL TIMES FOR COMBINED BELL UH-1H B32, B48, AND B72 DURING DT/OT II BASED ON 611.5 FLIGHT HOURS

	INHERENT REPLACEMENTS											
	MAJOR ITEMS			MAJOR ITEMS DYNAMIC COMPONENTS			MINOR ITEMS			MINOR ITEMS DYNAMIC COMPONENTS		
SUBSYSTEMS	NO. EVENTS	ACM* HOURS	MMH**	NO. EVENTS	ACM, HOURS	MMH	NO. EVENTS	ACM, HOURS	MMH	NO. EVENTS	ACM, HOURS	MMH
Airframe							30	54.7	86.66	1	0.7	1.71
Landing Gear							3	5.5	6.24			
Powerplant							23	18.6	21.93	2	1.6	1.57
Drive System	4	4.0	9.32	4	4.0	9.32	51	39.7	63.30	25	22.8	38.16
Hydraulic							7	6.0	6.73			
Pneumatic												
Instrumentation							10	2.2	2.53			
Electrical							27	11.8	20.48	1	1.4	2.10
Fuel							2	0.4	0.30			
Flight Controls							13	8.5	14.48	11	5.6	9.23
Utility							4	1.7	1.69			
Cargo and Personnel Handling Equipment							2	0.3	0.46			
Auxiliary Power Unit	—	—	—	—	—	—	—	—	—	—	—	—
Avionics							14	2.5	2.68			
Armament												
TOTALS	4	4.0	9.32	4	4.0	9.32	186	151.9	227.48	40	32.1	52.77

*Actual Clock Maintenance Time
**On Aircraft Maintenance Manhours Including Direct and Indirect

TABLE 6 SUBSYSTEM INDUCED REMOVAL TIMES FOR COMBINED BELL UH-1H B32, B48, AND B72 DURING DT/OT II BASED ON 611.5 FLIGHT HOURS

SUBSYSTEMS	INDUCED REPLACEMENTS											
	MAJOR ITEMS			MAJOR ITEMS DYNAMIC COMPONENTS			MINOR ITEMS			MINOR ITEMS DYNAMIC COMPONENTS		
	NO. EVENTS	ACM* HOURS	MMH**	NO. EVENTS	ACM, HOURS	MMH	NO. EVENTS	ACM, HOURS	MMH	NO. EVENTS	ACM, HOURS	MMH
Airframe							1	0.5	0.50			
Landing Gear												
Powerplant												
Drive System	2	3.1	10.26	2	3.1	10.26	2	1.1	1.23			
Hydraulic												
Pneumatic												
Instrumentation												
Electrical							1	0.1	0.12			
Fuel							2	0.7	0.99			
Flight Controls	1	1.3	5.08	1	1.3	5.08						
Utility												
Cargo and Personnel Handling Equipment												
Auxiliary Power Unit	—	—	—	—	—	—	—	—	—	—	—	—
Avionics												
Armament												
TOTALS	3	4.4	15.34	3	4.4	15.34	6	2.4	2.84			

*Actual Clock Maintenance Time

**On Aircraft Maintenance Man-hours Including Direct and Indirect

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